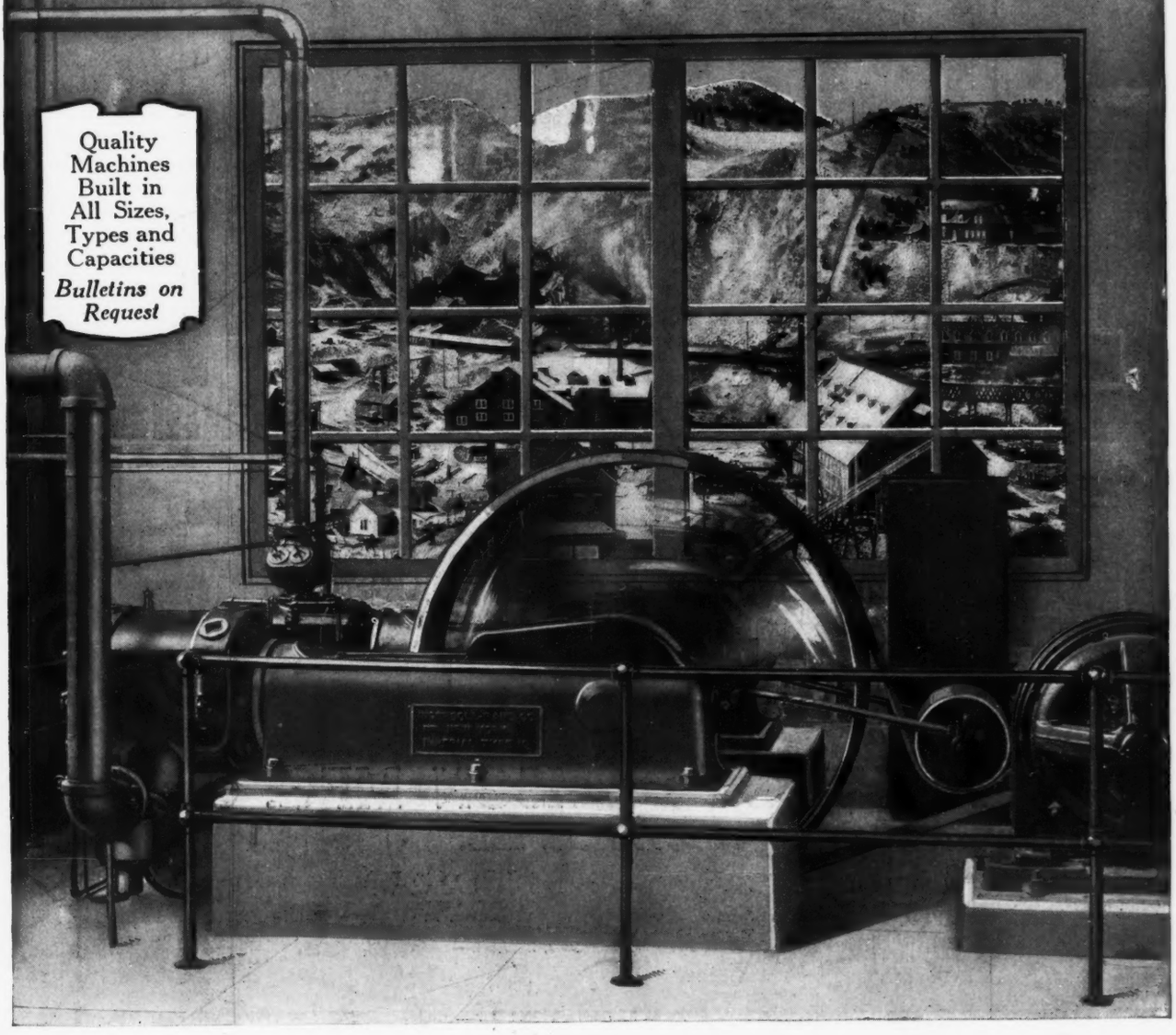
GENERAL LIBRARY
JUN 11 1919

Engineering and Mining Journal

McGraw-Hill Co., Inc. Price, 20c. New York, June 7, 1919

INGERSOLL-RAND
COMPRESSORS
A Time Honored Institution Wherever Ore Is Mined Or Rock Broken

Quality Machines Built in All Sizes, Types and Capacities
Bulletins on Request



S-A BELT CONVEYORS
for DEPENDABLE SERVICE

Day in and day out S-A Belt Conveyors glide smoothly along with heavy loads of material. The S-A Self-Propelling Trippers move slowly back and forth over the bins, evenly distributing the load thruout the entire length of travel.

S-A Conveyors are designed for this continuous, heavy-duty service—they stand the test.

STEPHENS-ADAMSON MFG. CO.
AURORA, ILL.

New York, N. Y.
Chicago, Ill.
St. Louis, Mo.
Boston, Mass.

Pittsburgh, Pa.
Detroit, Mich.
Los Angeles, Cal.
Cincinnati, Ohio

Salt Lake City, Utah
Huntington, W. Va.
Toronto, Canada
Vancouver, B. C.

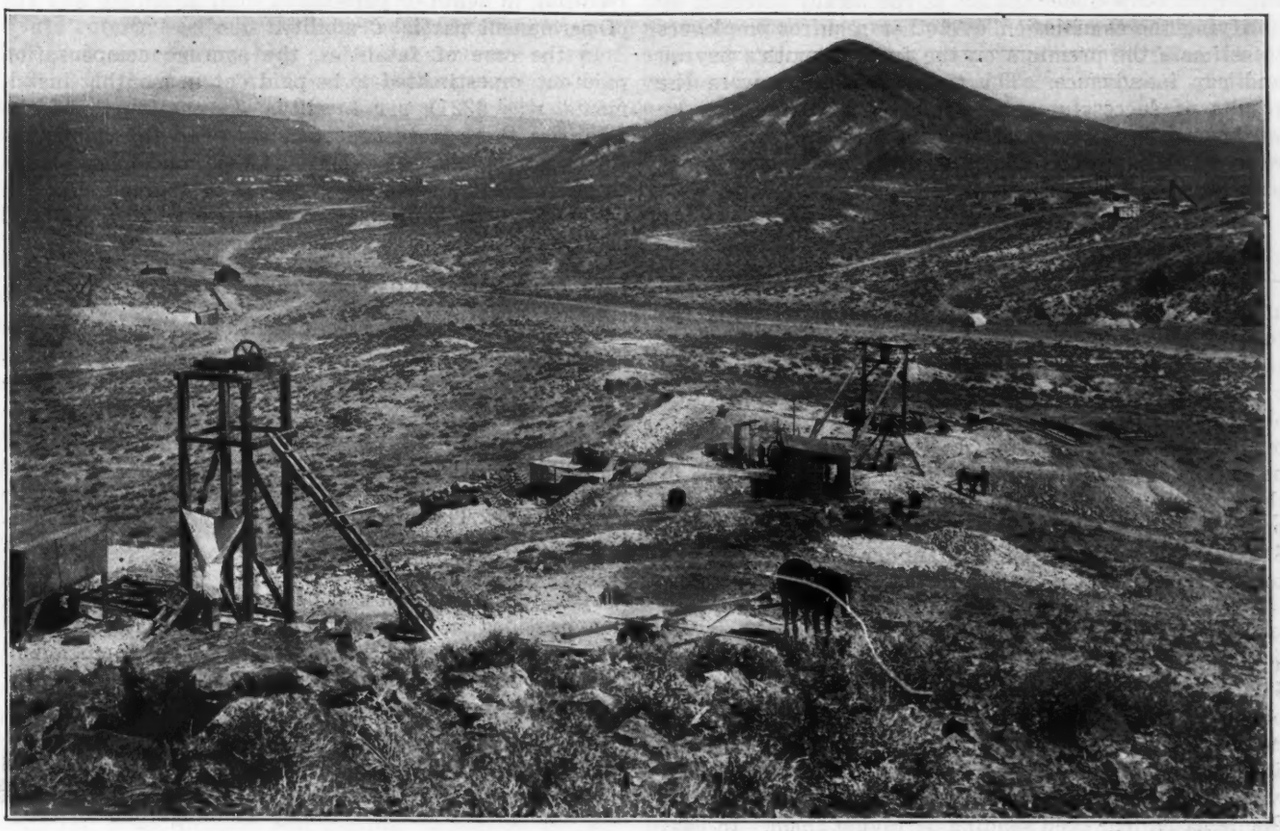
Johannesburg, South Africa
Sydney, Australia
Kristiania, Norway

Osaka, Kobe, Yokohama, Tokyo—Japan
Calcutta, Bombay, Singapore, Rangoon—India

Engineering and Mining Journal

June 7, 1919

Volume 107 Number 23



THE BEGINNINGS OF GOLDFIELD, NEVADA

State Industrial Insurance in Nevada

BY JAY A. CARPENTER*

Industrial insurance was started in Nevada in 1913. It was made voluntary on the part of the mining companies as to whether they would take advantage of the act. The rates established varied from 0.5 to 3% of the payroll for different kinds of workers in the mining industry. The total compensation for death ranges from $125 in the case of a single man without dependents to a maximum of $80 per month where a family is left. In the two-year period, July 1, 1916, to June 30, 1918, a total of $328,943 was collected in insurance premiums upon a total payroll of $14,891,436, covering mining operations in copper, silver, gold, and other mines in the state. The act has been economically administered and has received whole-hearted coöperation from the mining industry of Nevada. In 1918, 6295 men were employed in the mines of the state. Record shows milling to be almost as dangerous as mining.

THE first Nevada industrial insurance act was passed in 1913. It covered a wide range of industries, including mining. The legislation was not compulsory, but employers were required to give notice of rejecting the act, or they were presumed to have accepted it. The law gave a tabulated list of accidental injuries, with the compensation for each, extending from an injury that caused partial disability for over two weeks up to accidental death. The administration of the statute was assigned to a commission that was given authority to levy such rates upon the payrolls of the separate industries as were deemed necessary to carry out the provisions of the act.

The commission established the following rates upon the mining industry: All workmen underground, 2.5% of the payroll for that class of employees; shaft sink-

*Mining engineer, Tonopah, Nevada.

ers, 3.0%; surface workers, 2.0%; reduction workers, 1.25%, and clerical employees, 0.5%. The maximum payment to any one individual was limited to $120 for one month, and anyone whose duty caused him to visit underground workings was classed as an underground workman.

In 1917, the industrial act was amended to a considerable extent. One amendment provides that only such employers come under the act as specifically accept it by notifying the commission. Another requires employers to estimate the premium on the future month's payroll and pay in advance. The two amendments were the results of successful suits against the commission by workmen injured at small mines operated by companies which had not given notice of rejection, but had not paid the industrial insurance.

Compensation for Injuries

The compensations for injuries were made higher and are as follows: For temporary total disability extending over one week after injury, the compensation is 50% of the wages, but not to exceed $70 per month or extend over 12 months, and for permanent total disability it is 50% of the wages, but not over $50 per month, to extend for life. In case of death, the compensation varies from only $125 for burial expenses in the case of a single man without dependents, to $36 per month to a widow until death or remarriage, with $12 per month for each child under 18, provided the total compensation does not exceed $80 per month.

The foregoing figures are stated in the act as a percentage of the workman's pay, but are given here for a workman who earns the maximum rate figured of $120 per month, which is practically true of every employee of a mining company in Nevada today. In the case of partial dependents, their allotment is a percentage of the amount for total dependents to correspond with the percentage of the total monthly wages that the deceased had been sending or giving them. In case the dependents are aliens not living in this country, compensation is 60% of the regular amount. For partial permanent disability there is a wide range of compensation to suit the nature of the disability.

These compensation figures were higher than those of the original act, and as the commission did not feel that enough reserve funds had been accumulated under the old rates, it changed the rates. As the amounts that the commission had paid out for compensation in the mining industry had been higher than expected, the rates for mining and milling were increased, and, at the same time, the rates were reduced in nearly all other industries. The mining rate was increased to 3.5% and the milling rate to 2.0%, both to be figured on the gross payroll. The mining rate included all mine workers, whether surface, shaft, or underground. The Nevada Mine Operators' Association objected to this increase, as its members considered it unnecessarily large, and that, as the compensation was based upon a maximum pay of $120 per month, the assessed rate should not be applied to any sum over $120 paid to any individual. In the case of high-salaried employees, ranging from $5000 to $10,000 per year, whose underground risks are very light, the companies were forced to pay from $175 to $350 accident insurance per year for each employee.

The result of this increase in rates, and a great deal of valuable data on industrial insurance, are given in the biennial report of the Nevada Industrial Commission, recently issued. It covers the period from July 1, 1916, to June 30, 1918. In this period $328,943 in insurance premiums was collected upon a total payroll of $14,891,436, covering mining operations in copper, silver, gold and other mines. In this time, 1921 accidents were reported, of which 449 were minor injuries of less than a week's duration. There were 47 accidents resulting in death or permanent total disability and 164 of permanent partial disability.

In the case of fatalities, the average compensation paid out, or estimated to be paid out in monthly instalments, was $3211 per fatality. In one-fourth of the fatalities there were no dependents and the compensation was only that of burial expenses, and in one-tenth there was left a widow with three or four children, in which cases the compensation is estimated at over $8000 per case.

Total Compensation Liability

The total liability for compensation on the 1921 cases is estimated by the commission at $328,943, which amounts to 2.21% on the total payroll exposure. The administration cost was 8.5% of all the premiums collected. The mining premiums averaged 3.3%, giving an administration cost of 0.27% on the payroll. The total cost then becomes 2.21% plus 0.27%, or approximately 2.5%. The commission steadily lowered the mining rate from 3.5%, until on Oct. 1, 1918, it again reached 2.5%, which the commission states is "believed to represent the actual cost of furnishing the compensation provided in the act for mining operations under the present scale of benefits and wage conditions." However, the milling rate, which was originally 1.25%, and which was increased in 1917 to 2.0%, was again increased on July 1, 1918, to 2.25%, as the estimated compensations alone in the two-year period amounted to 1.92%. From these figures it is apparent that the mill man in Nevada has nearly as dangerous an occupation as the miner.

Ample Reserve Is Accumulated

As a result of the sharp increase in mining rates in 1917, giving an average of 3.3% for the two years, the premiums collected exceeded the 2.5% actual cost by over $110,000. The commission shows a much smaller excess in other individual industries. This gives a ample reserve for a $100,000 catastrophe fund, and the commission suggests that the excess over this amount be prorated to the industries.

The commission has over $500,000 invested in first-class county, state, and national bonds, this amount being more than enough to cover all book reserves for pensions allowed and liability for pending claims.

Administration Cost Is Low

The administration cost of 8.5% of the premiums collected is a low figure and reflects credit upon the state and the commission. The marked advantage of state insurance over that in private companies lies in the small percentage of the premiums required to conduct the business. A reliable authority on liability insurance companies states that the rates are usually set so that the losses are not more than 40% of the premiums. In the case of private companies seeking business, the usual commission to agents alone is 5.0% of the premiums collected. One of the largest and best mutual life

insurance companies in the United States shows on its recent annual statement a total administration cost of 30% of the premiums collected, which includes, among other expenses, commission to agents, taxes, and office rents. With state insurance these heavy items are eliminated. However, with state insurance, as with other state-controlled industries or departments, there is lacking the incentive to economize for the purpose of increasing earnings that is nearly always present in private enterprises, and there is the temptation to employ much unnecessary help and to be generous or even prodigal in the payment of fees, traveling expenses and the like, to gain political prestige and to fatten the rather slim salaries prescribed by the state.

The excellent record of the Nevada Industrial Commission for economy and efficiency should be a matter of pride to the people of the state. Credit should be given also to Governor Boyle, himself a mining engineer, and to the Nevada Mine Operators' Association for their interest in the success of the industrial insurance act, and for their aid and advice to the commission.

The Nevada Consolidated Company

The Nevada Consolidated Copper Co. did not at first elect to come under the provisions of the act. On account of its large number of employees, the company was able to insure with private companies at a low rate, and its officials were probably skeptical of state insurance. Later the commission gave the company a special rating by putting it in a class by itself. In the last two years this company has paid an average premium of 1.82% on a total payroll of over $9,000,000. The total compensation for injuries amounted to 1.60%. As this leaves only 0.22% for administration, it is evident that the company has had insurance at cost without the annoyance and the friction of damage suits that accompany the usual industrial insurance.

All the other mining and milling companies of Nevada in the same two years paid an average premium of 2.95% on a total payroll of over $19,000,000, and the compensation for injuries amounted to 2.0%. It is probable that the average employee of the Navada Consolidated, with its caving system, open-pit operations, and its mill and smeltery work, has as great an inherent hazard in his work as the average employee in the other mines and mills of the state, and, therefore, the smaller percentage on the payroll paid out for compensation at the Nevada Consolidated is probably the result of a persistent safety-first campaign and excellent first-aid and hospital facilities.

It is probable that several of the large mines of the state had as low an accident record as the Nevada Consolidated, but other less fortunate or less careful companies had an undue number of accidents. By Sec. 22 of the amended act, the commission is given the right to advance the premium rates of any establishment that is more dangerous than other similar works. The commission has wisely hesitated to use this authority, but has recommended that it be allowed to give special lower "merit" ratings to the contributor that makes special provisions for avoiding accidents and shows less accident compensation than other similar contributors.

The original act primarily dealt only with compensation for injuries, and did not provide for the cost of medical attention and hospital facilities. As these items are necessary to keep minor injuries from developing into compensation cases, and upon the theory that if the industry is morally liable for compensation for accidents to its employees it is also responsible for medical and hospital attention, the act was so amended in 1917 as to make it compulsory upon the industries to give such attention to their employees in case of accident, and to provide for state insurance, as in the case of compensation, for accidents. To cover the cost of this insurance, the employer pays an accident-benefit premium upon his gross payroll, but the law allows the employer to collect not over $1 a month from each employee as the workman's share of the cost of this protection.

Companies having their own hospital are not required to insure with the state, but they must furnish the same benefits to the injured employee, which are defined as prompt "medical, surgical, and hospital or other treatment, nursings, medicines, medical and surgical supplies, crutches, and apparatus, including artificial members, as may be reasonably required at the time of injury and within 90 days thereafter, which may be extended to one year by the Nevada Industrial Commission." These companies are also allowed to collect $1 a month from their employees. The commission is given general authority over the hospital associations in respect to the physicians employed in case complaints are made by employees as to the medical treatment received. In the case of the small companies insuring with the state, the commission sets a scale of fees for medical and hospital attention, and the injured employee is taken to the nearest place equipped for proper treatment. The injured man is given his choice of physicians. It is obligatory on the employer to render first aid and to take the employee to the doctor or hospital if necessary.

Accident-Benefit Premium

The commission set the accident-benefit premium at 75% of the compensation-premium rate. In the year period 1917 to 1918, a total of $29,095 was collected on a gross payroll of about $3,300,000. The cost of all medical treatment was under $10,000, leaving an unexpected surplus. As a result, the rates for 1919 are materially reduced, except that in the mining and packing-house industries the rate remains the same. As the mining rate for 1919 is 2.5%, the accident benefit rate is 1.875 per cent.

Only about one-fifth of the employees covered by state compensation insurance are covered by the state accident-benefit insurance, owing to the large number of hospital associations. For an employee earning $5 per day working for 30 days the insurance costs $2.80, of which the employer is allowed to collect $1 from the employee, making the net cost $1.80. With the hospital associations the cost to the companies will average from 50 to 75% of this amount. The higher cost of the state insurance is due to the fact that it covers all the more remote and isolated mines of the state and does not have the compensating advantage of the large mines and camps. The larger hospital associations give the employee for his $1 per month not only medical and hospital attention for accidents, as the law requires, but also for nearly all forms of sickness and ill health. The smaller associations as a rule have an agreement whereby the employee pays an additional dollar for this extra service.

Before 1913 Nevada was a backward state in the matter of industrial insurance. The courts were filled

with damage suits. The matter of compensation for injuries was a sore spot between employer and employee, and the first step in the case of an accident was to prepare for a legal battle. It was incumbent upon the company to prove, if possible, that the accident was the result of the man's own carelessness, whereas the injured man tried to prove that it was due to the negligence of the company or one of its employees. Many an engineer and company employee have been placed upon the witness stand as an unwilling witness either by the request of the company or by an injured fellow workmen. Such trials fanned the flames of mutual distrust and animosity between employer and employee. The damage suits were always for large sums, out of all proportion to the present compensation rate, as the injured employee or his heirs ran the risk of losing the suit and by agreement signed away the lion's share of the possible judgment to the attorney as his fee and court expenses. A jury trial was usually demanded, and the employee was likely to win in the lower courts, which resulted in more expense and long delays for appeals and review of the case by a higher court. One case went to the U. S. Supreme Court.

The result as to compensation was a great inequality. A discouraged employee either settled for a pittance, or was given an excessive amount by a legal judgment. In any case the employee had high medical and hospital bills that he could not usually pay, thus throwing him upon the charity of the company, his friends, or his union. With a family man even a minor accident was to be dreaded by the whole family. The mining engineer who has seen the carefully nursed profits of months wiped out by lawyers' fees and a judgment, or has witnessed the pitiful poverty and hopelessness of a home where the wage earner is laid up by a serious accident, can realize what a blessing accident relief and compensation laws with state insurance are to both employer and employee.

Nevada is now one of the foremost states in industrial insurance. Today an injured man is given the best of care from the moment of his injury; he and his dependents are assured that they will not suffer from actual want, and his mind is relieved of the worry and fear that delay recovery. The employer no longer dreads the trouble and cost of damage suits and is no longer deeply concerned as to the relative responsibility of the man and the company for the accident, but his one concern is to see that the man gets the best of care. Though the cost of the insurance is relatively high, all other employers in his industry have the same expense, and therefore, in a measure, the cost is added onto or figured into the selling price of his product.

Necessity for Workmen's Protection Not Relieved by Safety First

The importance of this protection to the workman in the metal mines is shown in the fact that, in spite of all the safety-first work and safety appliances of the last two years, the report of the commission shows that the average mine worker will meet with one accident in approximately every five and a half years that will lay him up from one week to eternity, with the chances of it being the latter about 1 in 32.

Only 10 years ago the first state industrial compensation act for the purpose of transferring to industry the cost of accidents arising in that industry was declared unconstitutional by the Appellate Division of the Supreme Court of the State of New York. It is strange that the old doctrines of common employment, contributory negligence, and acquiescence that had been discarded years before by the monarchies of Europe still found acceptation in the courts of our country and that the only method of obtaining compensation was by the employer's liability under the common law.

The old monarchies of Germany and Austria had for years not only industrial compensation laws, but also required employers to insure with the state against these risks. However, when the justice of it all struck home to the American people, and American legislators became more imbued by the Roosevelt idea of the "square deal," the progress was rapid and the country can expect still more rapid progress along humanitarian lines, because the American people have been awakened and broadened in their sympathies by their sacrifices for the sake of humanity in the Great War. It is now possible to look forward with confidence that the new laws will not place too heavy a burden of taxation upon American industries and state governments, because the high cost of government in the last two years, and the present method of direct income taxes reaching nearly to the income of the average laborer, have awakened the American citizen, by a direct touch upon his pocketbook, to the necessity of an honest, economical government.

Uses of Mercury*

The use of mercury for thermometers consumes, according to F. L. Ransome, only a small fraction of the total quantity produced. Mercury is a constituent of many drugs and chemicals, including calomel and corrosive sublimate, and mercuric oxide and mercury salts are used in the manufacture of certain chemicals of which the mercury itself does not form a part. For example, in one process of producing glacial acetic acid, acetylene is oxidized with mercuric oxide, the same lot of mercury being used repeatedly. Mercury is used also in making phthalic anhydride and phthalic acid, organic compounds which are employed in the dye industry but which themselves contain no mercury.

The use of mercury fulminate as a detonator has expanded enormously with the increase in the variety and efficiency of the high explosives now manufactured for industrial and military purposes, and, although primers have been made of other materials, especially for small arms, no substitute has found general acceptance.

Quicksilver is now used extensively in the manufacture of anti-fouling ship-bottom paint. The consumption of quicksilver in gold-dredging and other placer operations is still large. In gold-quartz mills, however, the amalgamation process has been partly supplanted by cyanidation.

Among the varied uses to which quicksilver is put may be mentioned also its employment in dental amalgams; in the manufacture of laboratory air pumps and other scientific instruments; in thermostats, gas governors, and similar appliances; in mercury-vapor electric lamps; in compounds for preventing scale in steam boilers; in cosmetics; in certain electrolytic processes for the manufacture of chlorine, caustic soda, and picric acid; in primary batteries, electrolyzers, rectifiers, and other electrical equipment; and in felt making.

*Excerpt from *Bull.* 666-FF, U. S. Geological Survey.

Alsatian Potash Industry

SOON after the United States entered the Great War, one of the German newspapers advanced the claim that the reason for America's entry was to secure a supply of potash from the Alsatian potash deposits. Ridiculous as this claim may have been, it is interesting to note that French engineers have already visited the Alsatian potash mines to survey the damages caused by the late intensive operations of the Germans, and to determine the best methods of rehabilitating this Alsatian industry. Their reports are not yet available; but Charles Bonnefon, a special writer for the *Echo de Paris*, followed the French engineers and has written an account of his trip. Though his point of view is that of the layman, some parts of his articles are of especial interest and are reproduced herewith:

"The Alsatian potash deposits are found at depths varying between 450 and 760 m. The shafts are generally twin shafts and communicate. . . . There are two superimposed potash beds, the upper having an area of 90 sq.km. and the lower covering about 200 sq.km. The first has an average thickness of 1.8 m. and the second 4 to 5 m. The salts contain 20 to 22% of pure potash on the average, but vary from 9 to 40% or even higher.

"I descended the Théodore shaft, the richest in the district, to see if the rumors that the Germans had 'gutted' the mines were true. . . . Stepping out of the cage, our party entered a rose-colored gallery in which small cars were in operation. To the right and to the left on the walls, the vein was exposed in thin horizontal but regular bands of yellowish rock salt and sylvinite (sylvite). One sees the whole gamut of hues, from the most delicate rose to a bright red, cut by white bands. Along the slate roof of the gallery the timbers give evidence of the crushing weight of the mountain, and presently it is necessary to stoop. Then the gallery enlarges, and we find ourselves in a chamber 6 m. in height with the gray arch supported by rose-colored pillars cut in the solid salt. This attractive color is not due to the potash content but to the iron which the salt has absorbed. On the right and the left are black openings obstructed in some cases by blocks of broken salt. In one of the openings a drilling machine is being operated by two workmen. Twenty holes have been drilled to a depth of 1.5 m. The holes are later loaded, and, after taking up the track, everyone leaves. The dynamite does the work; not a pick is needed.

"In general, the damages caused by the Germans in the potash mines have not been great, except through intensive operation without proper regard to the work of conservation of the mine openings. It is necessary to do much repairing, to reconstruct incline planes, battle with the crushing weight of the mountain and the water and to do other nonproductive work. The workers now receive from 8 to 19 fr. per day and work underground six hours per day. These reasons, the rise in wages, the increase in the number of workers, and necessary restoration of the mines, explain why the potash industry here is today losing money.

"In the Reichsland works I observed the rose-colored crystals being transformed into the purified white salt of commerce. The larger blocks of crude salt are delivered to a crusher, the product from which passes over a moving grizzly. The small pieces go directly to a roller mill. The product is then screened and passed to a second mill. Oversize is returned until it is ground sufficiently fine. The ground mixture of rock salt and potassium chloride contains from 9 to 22% potash, figured as pure K_2O. A common grade is 14%, and this appears in commerce as 'kainite,' though in reality the Alsatian product is sylvinite (sylvite) and does not contain a trace of sulphate.

"The lower-grade salt is dried in long furnaces and sold, without refining, to the agricultural industry. The richer salt running up to 22% is treated for the separation of rock salt and potassium chloride. An Archimedean screw conveys the powdered salts into a series of vats under which a fire is maintained. The salts there encounter a current of water saturated with common salt. The potassium chloride is taken into the solution, which refuses the common salt. After 'cooking' slowly in the vats, the mixture flows away and is delivered into long storage reservoirs or vats. At the end of several days, when the solution has become cold, the bottoms of the storage vats are covered with a white bed about 50 cm. thick. This deposit is taken up with shovels and loaded into cars. It is KCl of 80% tenor, or may be even up to 98 per cent.

"The Alsatian potash industry will bring back to the country, if our exploitation attains a half of the German exportation, a net profit of 40,000,000 fr. per year, but there remain to be solved the problems of manpower, and the refinancing of these enterprises.

"In the archives of the Reichsland works I found some statistics which characterize the activity under the German régime. General estimates have placed the value of the Alsatian potash industry at from 20,000,000 to 60,000,000 fr., but little reliance can be placed on these estimates, as the Germans have been anxious to include this in their final accounting. Tomorrow such estimates might have to be reduced one-third—if one discovers additional deposits or manufactures or finds a better fertilizer. Before the war Germany had a monopoly which permitted her to maintain remunerative prices. Whether the competition that will certainly ensue between Alsace and Stassfurt will come to a head in a new convention or not, the total value of the potash mines will be affected by this changed ownership. Although the Franco-Alsatian group occupied second place in the number of concessions, nine-tenths of the production was in the hands of the Germans. The value of the German investment in this industry, counting all elements, such as amortization, interest on capital, and like charges, reached 65,000,000 fr. This is the sum we shall have to give the German owners or have the German government reimburse the German stockholders.

"The statistics show that the Alsatian potash industry was only at the beginning of its development. If the Alsatian output formed only a small part of the German sales before the war, this was due to the fact that all the shafts were not yet sunk, nor were all the refining works completed.

"In 1914 there were 210 shafts in Germany and Alsace. Only a single Alsatian shaft possessed a complete installation giving it the right to a quota-part or definite allotment of the production. All the other Alsatian

shafts—Amélie II, Joseph, Else, Max, Marie-Louise, Marie, Théodore, Prince Eugène, Alex, Rudolph, Reichsland Est, Reichsland Ouest—12 in number—had rereived a provisional quota-part which would not exceed in any case 2.380 thousandths of the total production, i e., one-half of the definite allotment obtained by dividing 1000 by 210, or 4.760 thousandths.

"All the Alsatian shafts that attained completion during the war obtained their definite allotment, which was raised to six or eight thousandths of the German production. Their capacity was thus judged superior to that of the average installation. The Alsatian deposits are, in fact, richer than the German.

WORKING SHAFTS IN 1919

"In April, 1919, five shafts were working: the Reichsland, Théodore, Alex, Max, and the Marie-Louise. Of these, three had complete installations: the Reichsland, Théodore, and the Max. The actual production is 2000 tonnes per day. In three months the French officers have been able to double the Alsatian production. In July, 1919, Amélie I, Amélie II, Marie, Joseph, and Else will be repaired. The production will then exceed 5000 tonnes. By January, 1920, Reichsland and Prince Eugène will again be in working condition, which should bring the production up to 6000 tonnes. By 1922, Anna I, Anna II, Enisheim I, Enisheim II, and Rudolph having completed their shafts, the total Alsatian production should reach 9000 tonnes per day.

"Germany in 1914 extracted 16,000,000 tonnes of crude products, from which she obtained and sold 1,110,309 tonnes of pure potash (theoretical figure obtained by adding the amount of pure potash contained in the various mixtures). She exported 484,254 tonnes of concentrated and purified potassium chlorides (80% KCl). At this time the Alsatian output represented 48-1000 of the German production.

"We are thus in the presence of an industry at its beginning and which we receive from the hands of the Germans in a state of nearly complete preparation. We can produce daily only 400 tonnes of purified potassium chloride (80% KCl), and it is only this product that the United States needs. The area of France is slightly smaller than that of Germany in 1913, and if we wish to enrich our land as Germany has hers we should produce about the same amount as she uses at home. It would be necessary for us to place in order the flooded or obstructed shafts (nine in number), to secure in the shortest possible time mechanical drilling machines, to repair the reduction works damaged by our shells, to sink 40 or 50 new shafts, and, in short, to increase our facilities to a point capable of producing 300,000 tonnes of 80% salt per annum. The official figures indicate that it will be necessary to provide large capital in order to enter into serious competition with the German industry.

"The concessions accorded in Alsace up to the present number 112, of which 33 belong to the Société Franco-Alsacienne (Group Sainte-Thérèse). The other 79 concessions are held by the three German groups as follows: Deutsche Kali-Werke (the Stassfurt trust) 51 concessions; Wintershall, 13 concessions; Roechling, 15 concessions. Different opinions have been offered as to how we should exploit these rich resources, but, whatever solution is adopted, a serious financial effort is necessary to place France in the first rank of potash production."

Underground Mechanical Loading

Underground shoveling by mechanical means has received considerable attention during the last few years, and it is believed that the following notes, abstracted from "The Use of Shoveling Machines in Underground Mining" (Myers-Whaley Co.), will be of interest in that connection:

In a magnetic iron-ore mine a Myers-Whaley machine, working in a stope, loaded from 150 to 170 tons per eight-hour shift, and was operated by a crew of two men. The machine was frequently stopped while waiting for cars; also during the time that the track was being cleaned and the boulders were being blasted. In development work, during 213 shifts of operation of the machine, 18,517 tons was shoveled, an average of 87 tons per shift, at a cost of $3530.81 or 19.07c. per ton.

In a red hematite iron ore mine, one of these machines loaded 87 cars, or about 148 tons per shift, working on a 12% grade. The ore here occurs in a pitching formation, main levels being driven from the slope opening to the right and left across the pitch. From these auxiliary slopes are driven down the pitch, and the rooms from which the production is obtained are turned off from the auxiliary slopes across the pitch, so that the room tracks are on a grade of not over 3 to 4 per cent.

The system of hauling is by ropes on the slopes, and horses are used to shift the cars in the rooms. Rooms are 24 ft. wide and about 10 to 12 ft. high. The weight of the rails used is about 40 lb., and 24-lb. steel is used for balance rails. The room space is drilled with 6-ft. holes, and the entire face of the room is shot down at one time, making approximately 150 tons per shot. The tracks are laid up within about 10 ft. of the standing face before the face is shot, so that the ore is shot down upon the tracks. Under these conditions and during 12 working days when the machine was under operation the mine was operating on single shift, and each machine loaded an average of 200 tons per shift.

The machine crew consisted of one operator and two car shifters. The operator was paid 26c. an hour plus a bonus of ½c. per car up to 100 cars and 1c. a car for each car over 100 cars. Car shifters were paid 25½c., with the same bonus. The total cost of the crew on a basis of 200 tons for a ten-hour shift was $10, or a labor cost of 5c. per ton. Hand loading is done on the same basis. The hand shovelers are paid 25½c. per hour, plus a bonus as follows: On the first 10 cars, 25½c. per car, and if they load more than 10 cars they are paid 1c. a car additional. The average loading was 10 cars, or 15c. per ton for the hand loading.

An example of the capacity and cost of shoveling with one of these machines in tunnel work is given in connection with a 10 ft. x 14-ft. tunnel in a gold mine in South Africa. At this place the shoveling machine competes with cheap labor, the Kafirs being paid 62c. for eight hours' work. The time for cleaning up a shot with machines was from 2 to 2½ hours, making the saving in the time of mucking about three or four hours, as it required from five to seven hours to muck out a shot before the machine was installed. Previous to the installation of the machine, the heading had been advancing about 130 ft. per month. The work was immediately increased after the installation of the machine to about 170 ft. per month. The labor cost of mucking with the machine was $3.22 per round. The cost of mucking by hand was about $12.60 for the same work.

Car Dumpers*

By JAMES A. JACKSON†

Although the present use of car dumpers in the metal-mining field is not extensive, there may be considerable application for them in that industry, especially where it is desired to empty cars with dispatch and the capacity handled by the dumper is sufficient to warrant such an installation. The operation of car dumpers in general is outlined and the outstanding features of different types are discussed in the following article, which recommends electric-power operation.

CAR dumpers are used for dumping coal, ore, limestone, or other kinds of free-flowing bulk freight from open-top standard railway cars commonly known as gondolas. The operation is carried out by inverting the car until its entire contents are dumped. The devices for this purpose may be divided into two general classes, the side-dump type and the end-dump type, the latter being little used, in this country.

The side-dump type can be further divided into two general classes, the turn-over type and the lift-and-turn-over type, each of which can be either movable or stationary. The first of these does not elevate the car more than is actually necessary to turn it into an inverted position. The stationary type usually dumps into transfer cars or on conveyors; but, if movable, these auxiliary devices can be omitted, and the dumping take place directly on stockpiles or into boats. The second type elevates the car vertically before starting to invert it, so that the car will be high enough to discharge directly into large vessels or high storage bins. This type is seldom made movable, on account of its height.

General Construction of Car Dumpers

The general construction of all types of dumpers consists essentially of a structural steel framework, rectangular in form, and containing a cradle to which the car is securely clamped during the dumping cycle. This clamping is done entirely automatically by an ingenious system of clamps, actuated by counterweights, which are so arranged as to accommodate themselves to all sizes of cars. In most dumpers, these counterweights serve two other purposes, the first being to assist in starting an overturned car in the downward direction, and the second having for its purpose to slide the car sidewise and hold it firmly against the side of the cradle.

To accomplish the sidewise sliding, the track on the cradle is carried on a platen which is supported on wheels and moves in guides to keep it in alignment. Some of the clamp counterweights are connected by ropes to this platen in such a manner that, as soon as the cradle starts to move upward, the platen and car move sidewise until the car comes up against the wooden bumpers on the side of the cradle. It is then held there throughout the dumping period until the cradle arrives at a point a short distance from the bottom, where a series of mechanical arms are used as a means of pushing the platen back against the action of the counterweights. This aligns the dumper tracks with the stationary tracks, and, as the top clamps have been automatically released, the car is ready to be pushed off the dumper by the next loaded car bumping into it. From the foregoing, it will be seen that a car is supported on the bottom, top and one side throughout the dumping period.

Differentiation of Motions Necessary in Operation of Car Dumper

The operation of a lift-and-turn-over dumper is similar to that of the turn-over type, just described, in so far as the rotation and the action of the platen and counterweights are concerned. In addition, however, the cradle and car are first lifted vertically to the desired height, at which point the hinge on the cradle engages the rotation pin and stops the vertical motion. The roping is so arranged that the motion of the cradle is immediately changed to one of rotation, thus dumping the car. In lowering, the reverse operation occurs, that is, the cradle is first rotated to a horizontal position, at which point the hinge and its pin are unlocked, permitting vertical motion downward to the starting level. One method of roping, the use of which prevents severe shocks and strains, is to reduce the speed of the cradle at the moment when the hinge pin engages in hoisting and when it disengages in lowering. When disengaging, wheels on each end of the cradle come in contact with vertical guides, which maintain the alignment of the cradle during the vertical lift, and, unless the speed is low, a severe side thrust is thrown on the dumper framework. With electrically operated dumpers, these slow-downs are obtained automatically by limit switches.

Factors Affecting Power Consideration

The power required to operate a car dumper is necessarily large, both on account of the heavy weight to be handled and because of the speed which must be made to make the dumper a profitable investment. Ordinarily, power requirements for the cradle hoist alone are from 400 to 800 hp., and even to 1000 hp. in some cases, to which must be added the requirements for any auxiliary equipment, such as the Barney haul, pan hoist, revolving chutes, conveyors, and other machinery.

Throughout the operating cycle on any specific dumper, the power requirements are continually varying, owing to the shifting center of gravity of the load, to the changing lever arm on which the rope acts, and to the action of the counterweights. Graphically, this makes an irregular power curve which varies in shape according to the physical dimensions and design of the cradle. In other words, almost any two different designs of dumpers will give different shaped power curves.

For some reason which does not seem to be entirely clear, the majority of dumpers installed up to within the last few years have been steam operated. A plausible reason seems to be that electric power in sufficient quantities has not been available in many places. However, where obtainable, electric power is more economical than steam, for no power is consumed unless the dumper is actually moving.

*Abstracted from *General Electric Review*, May, 1919.

†Power and mining engineering department, General Electric Company.

Electric power is more flexible, for the control can be entirely automatic after the dumper has once been started by the operator. It requires less ground space, for all the electrical machinery can be installed in a house on top of the framework which supports the cradle. Lowering can be accurately controlled by dynamic braking, and can be varied over a wide range of speed if necessary without special attention on the part of the operator. Maintenance cost is low and the labor requirements are small, as, aside from the operator, it is only necessary to have an electrician give the equipment a regular daily inspection and renew such wearable parts as contactor tips, controller fingers and segments and motor brushes when necessary. Another advantage is that the operator's cab may be conveniently located at the most desirable point. Electric power is essential on the movable type of dumper, for in this case the entire dumper structure, with its machinery, travels on tracks so as to dump at different points, which makes it necessary to conduct the power to the dumper by trolley wires.

If electric power is determined upon, the question of direct current versus alternating current must be decided. Direct current has some advantages for this service, although an alternating-current equipment can be designed which will give satisfactory operation. Braking is required throughout the entire lowering cycle. This action can be obtained simply and safely by dynamic braking with direct-current motors; whereas, with alternating current, dynamic braking requires a more complicated equipment, and is not so safe as with direct current. Furthermore, the torque characteristics of direct-current motors are somewhat more favorable for the service, and the torque is independent of the voltage. Direct-current control equipment can be laid out to give emergency dynamic braking, which will prevent a runaway should the power supply fail and the solenoid brake fail to hold the load. This cannot be done with alternating-current power, and the solenoid brake must be depended upon to prevent damage in emergencies. Positive low speeds while starting, stopping, and at the rotation pin are easier to obtain with direct-current than with alternating-current equipment.

A typical direct-current installation would consist of one or more motors of heavy design, with solenoid

HIGH LIFT, ELECTRICALLY EQUIPPED CAR DUMPER AT SEMET SOLVAY COKE PLANT, INDIANA HARBOR, INDIANA
1. General view of the plant. 2. Showing cradle in lowest position with car in place. 3. Showing cradle just passing the rotation pin. 4. Car in completely dumped position.

brakes such as are used in steel-mill service, regulated by magnetic control, and operated from a master switch in the operator's cab. The motors should preferably be compound wound, with sufficient shunt field to give a no-load speed of about 150% full-load speed, although series motors are often used successfully. Compound-wound motors give a more uniform speed, regardless of the weight of the car being handled. Also, dynamic braking and a "kick-off" can be obtained more efficiently, as the shunt field can be depended upon to insure excitation, instead of separately exciting the series field, as would have to be done with a series motor.

The service is such as to require an open-frame motor, as the heating is too severe for a totally inclosed motor. In figuring a duty cycle, the rest period between trips plays an important part in determining the best size of motor and should be given careful consideration. It is advisable in many cases to work out two duty cycles, the first of which would be based on handling the maximum number of cars possible for two hours, that is, the rest period would be a minimum. The second cycle would be based on the average number of cars which the dumper would be likely to handle in a 10-hour day. This would give a longer rest period, as it is unusual to be able to bring loaded cars to a dumper as fast as it can handle them for 10 consecutive hours. Motors could then be selected which would handle the average 10-hour load continuously and the maximum load for two hours without overheating. This would result in an economical electrical lay-out.

The motors should be equipped with full-torque shoe-type solenoid brakes, usually shunt-wound, to secure more economical operation in lowering.

The magnetic control equipment must be laid out to give automatic acceleration in the hoisting direction by cutting out series resistance, and must give at least one positive low-speed point by a resistance shunting the motor. In the lowering direction, a "kick-off" torque must be provided to accelerate all parts to full-speed rapidly, after which the torque must change to dynamic braking automatically, and thus lower the load safely at the correct speed.

Absolute Control of Various Phases of Operation Necessary

Automatic deceleration should be provided in the lowering direction, to prevent too high torque and current peaks, with consequent dangerous mechanical strains when the master switch is thrown suddenly to the "off" point. The control must have a speed protective relay to prevent too high a speed when it is found necessary to lower a loaded car. It should retain dynamic braking connections in the "off" position of the master switch and also maintain a dynamic braking circuit in case the power fails. A limit switch geared to the hoist drum must automatically provide an automatic slow-down and stop at each end of the travel; and, in the case of a lift-and-turn-over dumper, it must also provide an automatic slow-down and acceleration when passing the rotation pin in each direction.

Considerations If Alternating Power Is Used

If alternating-current power is to be used, the motor must be of the wound-rotor slip-ring type, with open frame, and be equipped with a full-torque shoe-type solenoid brake. The control should be full automatic and provide current-limit acceleration in the hoisting direction. In lowering, either of two different methods can be practiced. The first uses dynamic braking throughout the entire lowering cycle by applying direct current, from a small special motor-generator set, to one phase of the stator winding of the induction motor. The second uses regenerative braking except during the slow-down period, when dynamic braking would be applied by supplying direct current to the stator winding, as in the first case. This second plan has the advantage of being more economical in power, and it provides a "kick-off" to get the car started down quickly. It has the disadvantage that in changing over from regeneration to dynamic braking there is an instant when no power at all is applied to the motor, and means must be provided to prevent the solenoid brake from setting at this time. Furthermore, it is more complicated than the first method. If the first scheme is used, the dumper must have sufficient downward pull in any position to break the static friction and accelerate all the machinery, as no "kick-off" can be provided. This slows up the cycle. With either operating method, the solenoid brakes must be depended upon to stop the load if power fails, as no emergency dynamic braking can be obtained. For this reason it is advisable to have a separate powerful emergency brake, weight set, and operated through a suitable trigger which will trip from a flyball governor if the speed attains a definite amount above normal. Both schemes require a special motor-generator set for supplying direct-current excitation at the proper voltage.

Two or More Motors in Parallel

The shape and general lay-out of a car dumper are such that two or even four small motors operating in parallel work to better advantage than does a single large motor, and consequently dumpers are generally built in this way. The characteristics of direct-current series motors are such that two or more operating in parallel will inherently divide the load equally when hoisting, and it is not at all difficult to make them divide the dynamic braking load by adjusting the resistors. Compound-wound motors will usually divide the load near enough for all practical purposes when hoisting, and they also can be easily made to divide the braking load when lowering by resistor adjustment. Alternating-current slip-ring motors, however, have characteristics which do not favor parallel operation, as their speed-torque curve is too flat over a wide range of torque; hence the layout of an alternating-current operated dumper might have to be such as to sacrifice some good points in the machinery design and arrangement to make it adaptable to one-motor operation.

Where two or more direct-current motors are operated in parallel, it is customary for each one to have its own contactor panel and resistor and to operate all the panels in parallel from one master switch. With such an arrangement a disabled motor or panel can be quickly cut out by disconnecting switches and the operation continued at reduced capacity.

Recalculated Payable Ore Reserve at the Government Areas, according to the *South African Mining Review*, is given as 9,445,000 stoping tons, assaying $8.27 per ton over a stoping width of 78 inches. This constitutes the largest ore reserve ever developed by a Rand mining company, the reserve of the New Modder, which has long been pre-eminent in this respect, being 9,000,000 tons (as of June 30, 1918), valued at $8.90 per ton over 65 inches stoping width.

The United States Assay Office

THE U. S. Assay Office, New York, pays for each ounce of pure gold 1000 fine, $20.671,834,625, which figure is used in all calculations. Silver 1000 fine was paid for at the rate of $1 per oz. recently when the market was at the fixed price of $1.01⅛ for silver bullion, 999 fine. All silver deposits, which have been paid in silver certificates during the war, on and after May 1 will be paid in silver bars, 999 fine or over. Manufacturers who have had to pay bullion brokers a premium will find this an advantage. No deposits of less than $100 in value will be received. No platinum is handled by this office. The office is self-supporting through charges made for services to the public.

The average fineness of all the refined gold from the New York Assay Office has been 999.65 during the last year. Gold which when received is 999 fine or over is usually not refined but kept in stock. The greater proportion by far of the gold received is used for purposes other than currency. During the month of April, $4,000,000 in gold bars was sold, largely for dental and jewelry work. These bars are made from 5 oz. in weight up, but the usual size is 20 to 25 oz. Certificate bars are made with slight variations of a weight equivalent to about $8000 value per bar, and these are deposited with the Government, against which paper certificates are issued, thereby avoiding the minting operation, effecting a considerable saving, and relieving the bank and Treasury Department from the necessity of holding the coin.

Copper and platinum are recovered from the bullion. but lead is not, as the cost of recovery would exceed the value. Deposits are weighed on scales sensitive to .001 oz. for each draft, the maximum draft being 10,000 oz.

The melting and various other charges involved in the selling of bullion to the mints and assay offices of the United States are given in the following, which is reprinted from a circular issued by the Director of the Mint and effective Jan. 1, 1919:

MELTING CHARGE

On each deposit of bullion a melting charge of $1 shall be imposed for the first 1000 oz. or fraction thereof, and 10c. additional for each 100 oz. or fraction thereof in excess of 1000 oz., computed on the after-melting weight: Provided, That no melting charge shall be imposed on deposits consisting of uncurrent United States coin or stamped mint fine bars; or on silver bullion free from gold, of the fineness of 998 thousandths or over, when a satisfactory assay can be obtained without previous melting.

On deposits carrying nonmetallic material or separate particles of nonprecious metals, when the melting loss exceeds 25%, an additional charge of $1 for each deposit shall be imposed when the deposit weighs 150 oz. or less. On such deposits weighing over 150 oz. the charge shall be in accordance with the extra expense of melting operations.

TOUGHENING CHARGE

Deposits which fail to give concordant assays shall, at the discretion of the officer in charge, be subject to an additional charge equal to the cost to the Government for fuel, labor and materials used in remelting and treatment by the deposit melter. Impure deposits which fail to give concordant assays on dip samples from the second melting shall be returned to the depositor and the expenses incurred in treatment collected.

WITHDRAWAL AND REJECTION OF DEPOSITS

Deposits may be withdrawn by depositors at any time before payment is tendered for same, and thereafter at the option of the officer in charge of the mint or assay office, subject to payment in cash of such charges for melting, etc., as have been incurred up to the time of withdrawal. Rejected deposits (all those containing 800 thousandths or more of base metals must be rejected) are subject to payment in cash of such charges as have been incurred up to time of rejection.

PARTING AND REFINING CHARGE (RATE PER GROSS OUNCE OR FRACTION)

Class A.—Bullion containing gold and silver

Gold Content		Base Content	
Thousandths	Charge	Thousandths	Additional Charge
¼ to 250.....	$0.005	For each 100 or fraction thereof in excess of 50 up to 150.....	$0.005
250¼ to 500...	.02	For each 100 or fraction thereof in excess of 150.....	.01
500¼ to 949¾	.04	For each 100 or fraction thereof in excess of 150.....	.01
950 to 991¾...	.02	.....	.....
992 to 1,000..	.....	(No allowance for silver content)....	.....

Class B.—Silver bullion free from gold

Silver Content	Charge
700 thousandths or less.....	$0.04
700¼ to 850 thousandths.....	.02
850¼ to 950 thousandths.....	.01
950¼ to 997½ thousandths.....	.005
998 thousandths or over, if payment is demanded in bars of a higher fineness or if it is necessary to refine such bullion.....	.003

Upon bullion with but one precious metal present and having base content which is suitable for coinage alloy, including foreign coin and domestic mutilated or uncurrent coin, a refining charge will be imposed only when payment is demanded in fine bars, viz.:

Silver deposited for fine silver bars.....	$0.005
Gold deposited for fine gold bars	.01

When bullion contains less than one-fourth thousandth of gold and less than 8 thousandths of silver the gold or silver content shall be reported for benefit of depositor.

Gold coin containing over 8 thousandths of silver acquires the status of bullion and is subject to appropriate charge for refining.

ALLOY CHARGE

Two and one-half cents per ounce for the copper required for alloy, to be determined by taking one-tenth of the fine weight of gold, except when the base in the deposit is suitable for alloy purposes and the fineness above standard, in which case the alloy shall be determined by taking the amount of copper required to reduce the bullion to standard fineness.

BAR CHARGES

Bar charges as below shall be imposed when bars are sold or when a depositor requests, directly or indirectly, special size bars in payment for a deposit.

Gold bars may be sold only when of standard fineness or above, for gold coin or gold certificates only, and in lots of not less than $5000.

Silver bars may not be sold except upon special authorization.

GOLD-BAR CHARGES

	Per $100 Value
Bars of $5000 in value and over.....	$0.05
Bars of less than $5000 to $500, assorted sizes.....	.05
Bars of less than $500, assorted sizes.....	.07
Bars between $300 and $200, in lots of 20 bars.....	.09
Bars of a fineness of 999.9, not over $5000.....	.09
Bars of a fineness of 999.9, over $5000.....	.08

SILVER-BAR CHARGES

	Per Ounce, Gross
Bars of standard silver.....	$0.00½
Bars of fine silver, not less than 500 oz.....	.00¼
Bars of fine silver, between 125 and 500 oz.....	.00½
Bars of fine silver, 125 oz. or less.....	.00½
Bars of unparted bullion.....	.00½

ASSAYS OF BULLION AND PLATED WARE

	Charge
Gold samples.....	$2.00
Silver samples.....	2.00
Plated ware, rolled or filled (may be refused).....	4.00

ASSAYS OF ORES

	Charges
Gold and silver.....	$1.00
Copper, tin, zinc, iron, lead, and tungsten (each).....	1.00

Assays of ores will be made at the minor assay offices and the mints at New Orleans, La., and Carson, Nev., charges based on metals determined in sample.

The charges and regulations in the circular are as officially approved by the Secretary of the Treasury under date Nov. 25, 1918.

The Lance Creek Oil and Gas Field Of Wyoming

A detailed examination of the Lance Creek oil and gas field, in east-central Wyoming, about 25 miles west of the east line of the state, was made in September and October, 1918, by E. T. Hancock, of the U. S. Geological Survey, and a report describing and mapping the field is now being prepared. The purpose of this examination was to supplement the general information available by making detailed studies of the geologic structure, to determine as definitely as possible areas in which oil and gas may be found in commercial quantity.

The center of production in the Lance Creek field is about 75 miles nearly east of the Big Muddy field and about 90 miles east-southeast of the Salt Creek field. The discovery well in the Lance Creek field, in Sec. 36, T. 36 N., R. 65 W., was brought in at a depth of 3665 ft. by the Ohio Oil Co. on Oct. 6, 1918. At that time the yield of the well was estimated at about 1200 bbl. a day. Recently the Illinois pipe line was completed to the well, and, according to reports published in oil and gas journals, the well is producing about 2000 bbl. a day. The oil is low in sulphur, is of high specific gravity, and contains from 35 to 40% of gasoline.

About 2½ miles southwest of the discovery well the Ohio Oil Co. drilled another well, which is reported to be producing 8,000,000 cu.ft. of gas per day. Between that well and the discovery well is a big gas well brought in by the Buck Creek Oil Co. According to reports, this well is capable of producing about 60,000,000 cu.ft. of gas per day. The recent drilling of another 2000-bbl. well in the NW. ¼ Sec. 3, T. 35 N., R. 65 W., seems to show that the oil pool extends at least 2¼ miles further southwest. This well was drilled by the Ohio Oil Co. and is owned jointly by the Ohio Oil Co., the Midwest Refining Co., and the Buck Creek Oil Co. The Ohio Oil Co. is drilling another well in Sec. 33, T. 36 N., R. 64 W., about 3½ miles further east, and the Glenrock Oil Co. is drilling in Sec. 36 of the same township, almost exactly six miles east of the discovery well. The drill at each place is reported to have reached a depth of about 4000 ft. As these wells are far east of the productive area, they are naturally being watched with great interest.

On Oct. 6, 1918, when the discovery well was brought in by the Ohio Oil Co., about 22 rigs had been completed, but according to the *Wyoming Oil News* for Apr. 5, 1919, at least 125 rigs had then been completed and 35 wells were drilling below 1000 feet.

Geologic Structure in the Field

The field which is being tested with a view to ascertaining the limits of productivity occupies a great arch, or anticline, of sedimentary beds, the crest of which can be traced with considerable accuracy for about 18 miles. This crest forms a reversed or sigmoid curve which is believed to extend from Sec. 5, T. 35 N., R. 65 W., northeastward to the Ohio No. 1 or discovery well, near the northwest corner of Sec. 36, T. 36 N., R. 65 W., and from the discovery well almost due east to a point one-eighth of a mile south of the center of Sec. 25, T. 36 N., R. 64 W., and from that point a little east of north to the point where Buck Creek cuts across the Fox Hills escarpment, in Sec. 29, T. 37 N., R. 63 W. The extension of the crest of the arch southwestward is somewhat obscured by the overlap of White River beds.

The beds on the northwest flank of this great arch gradually steepen from a dip of 3° near its north end to 27° on Lance Creek, and from Lance Creek southwestward the dip is fairly uniform. The beds on the opposite flank of the arch dip southeastward for an indefinite distance at an angle of 2½° to 5°.

Outcrops Indicate Major Uplift

The outcrops of granite and overlying Paleozoic limestone at and north of Lusk, at Rawhide Butte, and near Hartville, all in direct line with the Old Woman anticline, strongly indicate the existence of a major uplift extending from the Old Woman anticline a little west of south for many miles. As the axis of this great uplift is only six or eight miles east of the Lance Creek anticline, the gently dipping beds southeast of the axis of that anticline doubtless soon become horizontal as they approach the larger uplift.

The Fox Hills sandstones, which at one time arched over the Lance Creek anticline, have been eroded away, and the surface along the crown of the arch has been formed on beds that lie several hundred feet below the top of the Pierre shale. The relatively low and even surface eroded on the shale is limited on the north by the conspicuous ridge formed by the Upper Cretaceous Fox Hills sandstones and on the south by younger Tertiary beds, which conceal the older formations in that direction for many miles.

Identity and Depth of the Productive Formations

Most of the work now being done to obtain oil is confined to the relatively low area between the outcrop of the Fox Hills sandstones on the north and the rim of Tertiary beds on the south. The beds that outcrop at the discovery well lie about 1300 feet below the base of the Fox Hills formation, and this depth, added to that of the well, 3665 ft., gives 4965 ft., the depth of the principal oil sand stratigraphically below the base of the Fox Hills formation.

If future development in this field shows that the oil comes from a sand higher than the Dakota, then the Dakota, Lakota, and still lower sands may be possible reservoirs of oil and gas. Even if the present supply of oil and gas is derived from the Dakota sandstone, there are still lower sands in Wyoming which contain oil and gas. In the Powder River field, for example, oil occurs in at least two sands in the Morrison and in small quantity in the Sundance formation. Furthermore, in the Old Woman anticline, about six miles from the Lance Creek field, considerable oil was found in what is believed to be the Minnelusa sandstone, a formation that lies much lower, belonging to the Carboniferous system.

French Imports of Lead in January, 1919, amounted to 432 metric tons, according to a recent issue of the *Ironmonger*. In January, 1918, and the same month of the preceding year, lead imports were 3117 and 5083 metric tons, respectively. According to the same source of information, lead ore was imported into France as follow: 76 metric tons in January, 1919; 4486 in January, 1918, and 4944 metric tons in January, 1917.

Making Sharp Drills Effective

By HARRY E. SCOTT*

CONSIDERING the amount of steel which has been sharpened by writers in the *Journal* and many other mining papers in the last year, there should be a large percentage of the drills in good condition. This being the case, would it not be a good idea to repair a few machines, and get them in condition to use this sharp steel?

The ability to take a pencil and figure out how deep a drill will penetrate the rock at each blow is not mine. From the time I used air drills on which the chuck wrench was nearly as heavy as the up-to-date machines, to the present, I have been kept busy trying to make the boss pull out a little more tape line each month and use a little less powder to pull the ground. So I have had no time to get down to $\frac{1}{16}$ and $\frac{1}{32}$ in. for each blow. The dark, deep-cut holes that would break were of more interest to the employer.

Writers on the subject never mention whether the tests have been made in a snow bank or in boulder granite, and consequently it is hard for a miner to tell whether he is keeping up to date or not. If the bit penetrates the rock $\frac{1}{16}$ in. at each blow, as some say it will, then the old timer will have to go, together with the piston drill, to the junk pile; as eight blows should clear the hole to *that depth*, 1200 blows a minute, well—pretty fast. The slides on the shell would begin to warm, and a motor would be needed on the feed screw.

No good drill man will use dull steel when he can get sharp steel, but there are times when it is necessary to fight a hole with dull steel for a few inches, when the steel is cut up into different lengths. In the shop, as a rule, drills are so made that one steel has to be run out before the next one will take hold. Should the gage become worn and the bit dull, on a starter or second before it is run in full length, one of the same kind will not go into the hole, as it is too large. The longer one will not go because there is not room; hence the dull one must be run out. This often happens in hard ground.

Many drill men are better off with dull steel than with sharp, as they cannot drill as deep holes with the dull steel, and consequently cannot get as much powder in them to waste. They put their holes in the easiest and most convenient place they can find, caring little how much ground they pull. All they are there for is to get in the shift. The question of footage never enters their gray matter.

Machines Must Be in Good Condition

There is no doubt that sharp steel is better than dull; but, if the machine has not the "kick," the work will not be up to the standard, regardless of the drills. The managers and superintendents of most mines give little or no attention to keeping the air drills in proper condition. They have the impression that as long as a machine will run it is all right, provided there are sharp drills.

In many mines the following conditions or similar ones prevail: A drill runner goes to his place of work when he goes on shift. In due time he gets a steel in the chuck and is ready to drill. He opens the throttle. The hammer may not strike a blow, or it may not hit with any force. The night shift has done something to it. The drill man on shift takes a monkey or Stillson wrench and goes after it. In taking it apart he loses the pawl plungers. The pawl springs look bad; the pawls are worn and the rifle bar is in bad condition. After a search for a cager or nipper, he sends for the parts, which *he thinks* the machine needs. By the time he gets the drill working again, from two to four hours of the shift are gone. No drilling has been done, and $10 worth of new parts have been used. In this case a sharp bit will accomplish no more than a dull one.

Another drill man finds himself in the same condition, but not being of a mechanical turn of mind he looks for another machine, and, if lucky enough to get one, sends his own on top. It eventually gets to the blacksmith shop, where it is thrown in the dirt until the blacksmith, his helper, or possibly some surface employee has time to work on it. It is put in the vise or, more often, lays on the floor while being repaired. It is taken apart, cleaned and put together with a few new parts from the storeroom—always new parts—at an expense of from $1 to $30, and the old parts are thrown on the junk pile.

Is this drill in good condition when it is returned to the mine? No one knows. There is no way of testing it in the shop. When the drill runner gets it he knows whether it has a good "kick" and if it rotates properly, but he knows nothing about the amount of air used to operate it. The air may be leaking through some part of the drill, or the valve may not be cutting off properly.

The idea that an air drill is "fool proof," and that any person on the job can repair it, is a mistake. A drill must be cared for properly, as well as any other piece of machinery. No matter how good the operator, it needs overhauling at certain intervals, in a shop fitted for that purpose and provided with a meter for testing the amount of air used. When a compressor making 2000 cu.ft. of air a minute has to be run at maximum speed to furnish air to a number of drills which, if in good condition, would use only 1500 cu.ft., there is something wrong. In most cases it will be found in the air drill.

Air Drill Repair Man

The air drill repair man, or machine doctor, as he is often called, is an important factor. The best repair men are those who have had a few years' experience running machines, and who are handy with tools and mechanically inclined. They know from experience the work to be done, and realize the troubles of the runner, which are many. A man of this kind who had become familiar with the cost of drill parts, and learned to throw nothing away that could be worked over and give efficient service, took a job. During the first 10 days he picked up over $900 worth of drill parts from the dump and junk-pile. These were used, and gave as good results as new parts from the storeroom would have done. They had been thrown away by the man who was repairing drills; and it had taken him only a short time to do it, and with only 16 machines on the job!

Any property using a small number of air drills can support a good repair man—one who can keep the drilling speed up (with sharp steel) and the maintenance

*Johnson, Arizona.

cost down. With the machines in good condition, sharp steel, plenty of air and the right man on the crank, there should be no kick from the office concerning the number of feet drilled.

Fuel-Oil Distribution System

An arrangement for the control of fuel-oil distribution by compressed air which has proved flexible and yet free from all complications is diagrammatically represented in the accompanying cut. The equipment consists of three pressure-tight storage tanks. The high-pressure air (50 to 60 lb.) is piped to these tanks and is controlled by the valves *A*, *B*, and *C*. Valves *D*, *E*, and *F* (when *A*, *B*, and *C* are closed), permit the exhaustion of the pressure from any tank whenever it is desired to refill that tank. In addition, each of these valves serves as an overflow in case a tank becomes too full. The supply of oil from the three tanks to the service line is controlled by the valves *H*, *I*, and *J*. The valves *K*, *L*, and *M* are used in the filling or transferring of oil from one to the other of their respective tanks. The valve *N* admits oil to the manifold from the main storage or from an oil car. The valve *O* may be used for drainage or cleaning of lines. A few examples of the manipulation of the system will make its advantages more apparent:

1. To fill Tank No. 1 from main supply: Open *D*, making sure *A* and *H* are closed, and allow air pressure

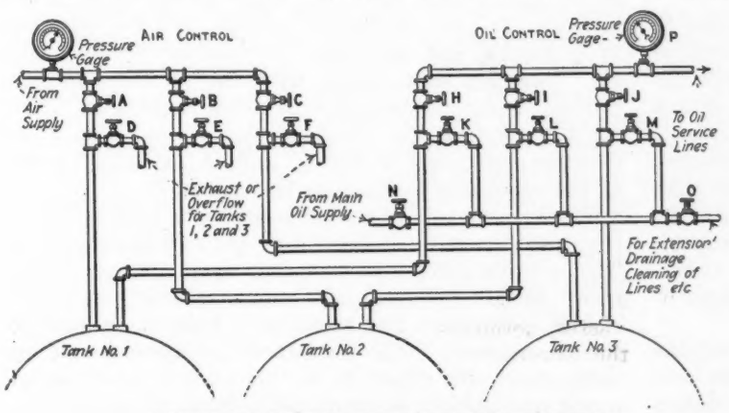


DIAGRAM OF OIL DISTRIBUTING SYSTEM

in tank to exhaust itself. Then open *N* and *K* and allow tank to fill by gage or until oil overflows at *D*; if there is no gage, then close *D*, *K*, and *N*.

2. To supply service line from No. 1 which has just been filled: Open *A* and then *H*.

3. To "change over" when No. 1 tank is nearly empty to No. 2, which is full, without interrupting the supply to line: Open *B*, making sure *E* is closed. Then open *I*, after which close *H* and *A*.

4. To transfer oil from No. 3 to No. 1 while supplying service line from No. 2: Open *B*, making sure *E* is closed, then open *I*, thus supplying service line from No. 2. Open *D*, making sure *A* is closed, and exhaust pressure from No. 1; then open *C*, making sure *F* is closed; then open *M* and *K* and allow No. 1 to fill from No. 3. When No. 1 is filled, close *D*, then *K*, *M*, and *C*.

5. To fill No. 1 from No. 3 while supplying service line from No. 3: Open *C*, making sure *F* is closed; then open *J*, thus supplying service line from No. 3. Open *D*, making sure *A* is closed, and exhaust pressure from No. 1. Then open *K* and open *M* as far as possible without lowering the service-line pressure at gage *P* below the minimum required, and allow No. 1 to fill from No. 3. When No. 1 is filled, close *D*, then *K* and *M*.

6. To partly fill only one of the three tanks from either of the two others, without having an employee watching it, e.g. to fill No. 1 from No. 3 while supplying service line from No. 3: Open *C*, after closing *F*, then open *J*. Open *D*, *A* remaining closed. Open *H* as far as possible without lowering the pressure on service line below the required minimum, and after the air pressure has been exhausted from No. 1 tank, close exhaust valve *D* and allow No. 1 tank to fill, compressing the air in No. 1 tank from atmospheric pressure to the same pressure as No. 3 tank, thus having No. 1 tank almost full of oil with air pressure high enough to use immediately, and no possibility of an overflow.

This system of distribution is not only fundamentally simple, but covers every contingency and insures an uninterrupted flow to the service lines. It can be made up of standard pipe fittings, and is so arranged that it may be readily added to or extended.

Tin Mines of Malay States Close Down

Rumors have recently been current that, owing to the closing down of many low-grade tin mines in Selangor and Perak, several thousands of able-bodied Chinese have been thrown out of work, many of them finding it difficult to provide themselves with food and shelter. A report to the Bureau of Foreign and Domestic Commerce states that confirmation has now come from Perak and Selangor correspondents, the former stating that a number of low-grade mines in Ipoh district have been closed, and the latter telegraphing that over 3000 men have been thrown on the labor market in Selangor since the Chinese New Year, owing to the closing down of mines in Sungei Besei and Salak South districts. Presumably a good many of these men will be able to get work on rubber estates, but many hundreds seemingly have not yet done so.

As regards the cause of this crisis in tin mining, it seems that though it paid miners at current prices of tin to work low-grade mines before the war, at present, with charcoal, rice, wages, and all kinds of expenses doubled and trebled as a result of the disturbance of trade, such mines can be worked only at a heavy loss.

Le Roi No. 2, Ltd.

The accounts of Le Roi No. 2, Ltd., for 1918 show a profit for the year of £4918 10s. 3d. During the period covered by the report 19,642 tons of ore was shipped to smelters, the average value per ton being $17.91, as against 10,984 tons, of an average value of $22.86, shipped during the previous year. Mining costs and smelting charges, after allowing for depreciation, aggregated $15.05 per ton, as against $15.82 per ton for 1917.

In view of the ever-increasing cost of production, combined with the serious fall in the price of copper, and also the uncertain market outlook, the directors declare that they do not feel justified at present in recommending the payment of a dividend.

Federal Aid for Prospectors

By E. J. RISTEDT*

DISCUSSION and formulation of plans and proposed legislation for the purpose of giving citizens of this country, more especially those who have been in the service of the United States during the war, a better opportunity of acquiring and developing Government land for agricultural purposes, affords an appropriate occasion for the consideration of proposals having for their object the extension of the scope of the project to the inclusion of mineral lands. To accomplish this purpose timely aid should be given the prospector.

The race of prospectors is a vanishing one. The younger generation is not attracted to that vocation, and the lack of interest is due in large measure to conclusions that are the results of personal observations. The old-time prospector has so grounded himself in the conviction that some day it will be his turn to win, that he has foregone the pleasures of life and been content to roam, stake his claims and do his assessment work, trusting that he will make enough out of one of his claims to develop the rest sufficiently to attract the capitalist or even to be able to operate them himself. In most instances he had little or no technical education, and his training along geological and mineralogical lines was often of a local nature, making it hard for him to apply his learning in some other district.

The young man of the present day who decides to follow a mining career is more thoroughly prepared than the old timer. A wider education makes him desire better living conditions and a more promising and positive outlook for the future. Then, too, the investing public, so often caught by unscrupulous promoters, demands a more thoroughly developed prospect than formerly before it will relinquish its money. During the readjustment period which the country is experiencing an excellent opportunity is offered for the stimulation of an interest in this initial and essential stage of mining under proper conditions.

The business men of the country express the opinion that conditions are changing. Numbers of them who have held places for their employees until their return are learning that these men, who have had probably their first real experience at out-of-door work, are not content to return to office or indoor tasks, but are willing to accept places at less pay that they may have outside employment. There are many others whose physical condition makes it advisable that they engage in out-of-door work: men who have been gassed or who are recovering from wounds, and who require a year of two years in the open to effect a complete recovery. It is much better that these men be engaged advantageously than to allow them to put in time at a hospital or sanatorium. They could be taught the rudiments of geology, mineralogy, and other necessary branches at the vocational schools in coöperation with the Bureau of Mines. The Bureau should extend this vocational training to others, as needs require, in order to maintain an efficient staff of men in the field and to perpetuate its work.

The Department of Agriculture is fulfilling its function so thoroughly that it is now looked up to by the average farmer as a final authority. It has accomplished this by becoming an aggressive institution, foreseeing conditions, conducting experiments, and then preaching its findings and doctrines directly to the farmer, advising as to the crops that will probably be in demand for the next season, and to a large extent directing the educational work in the country's various agricultural institutions and acting in conjunction with these schools in experimental work.

So it should be with the Bureau of Mines. Acting in an analogous capacity to the soil experts of the Department of Agriculture, the Bureau of Mines should have its prospectors, and so on up through each stage of the mining industry. Mining companies do a great deal more work, relatively speaking, on their technical and experimental problems than does the farmer, and they leave the initial prospecting stages for some one else, a choice that is usually left to chance.

One of the first and easiest steps for the Bureau to undertake in furtherance of a more extensive development of its field would be in the matter of publications, as, for example, in the issue of a clear, concise, and well-balanced "Prospectors' Handbook," describing geological structures that a prospector is likely to encounter, classes and forms in which various minerals occur, and simple tests for determining these; some mining law, the customs of various districts, elements of surveying, and any other information deemed helpful. Through coöperation with the U. S. Geological Survey, some publications covering mining districts could be condensed to a less technical form, which would describe accurately the district and its features in so far as the prospector is likely to be interested.

The actual employment of prospectors in the field by the Government is an important and necessary feature. The men should not be sent out until able to qualify above certain requirements. They should be of two classes, permanent and temporary, both to be paid by the Government. The permanent prospectors and investigators, who expect to do that kind of work permanently and will not be permitted to locate claims in their own names or to own any interest in sections that they have prospected, should be paid according to Government standards in the Geological Survey for work of that class. Those comprising the temporary class, which might well be the larger of the two classes, should receive their appointments for a certain definite period of time, from three to five years, and be allowed to locate a limited number of claims in any district in which they prospect. Their pay should be enough to permit them to live decently and provide means for subsistence while doing assessment work on located claims. They should be permitted leaves of absence from Government work for such periods each year as may be required to do assessment work. Or they might be given an option of working as prospectors for certain stated periods each year.

Prospectors of both classes should work under the direction of a district or state supervisor. They should be required to make regular reports on the districts they were working. The reports should include samples of geological formations encountered, with descriptions, and a compass survey of the section, noting its promi-

*First Lieutenant, Engineers, c/o Chief of Engineers U. S. A., Washington, D. C.

nent topographical and geological features. The equipment furnished should be only such as is needed in the field. Any samples requiring qualitative or quantitative determinations should be sent to the supervisor for this purpose.

The supervisor should be a high-grade engineer or equally qualified man and be provided with headquarters equipped for ordinary requirements. He should be instructed to further the interests of mining in his district, by means of lectures and demonstrations, or by bringing the Bureau of Mines into closer touch with the miner.

To carry this work one step further, a plan should be developed whereby a prospector could receive financial aid from the Government, provided he fulfilled certain necessary conditions. A few suggestions along this line are offered. The regulations should require that there must be sufficient evidence of ore to warrant continuance of operations, and that the claim must be patented and owned or controlled by the person applying for assistance. Corporations should not be eligible for this assistance. The amount that a person is allowed to request should be limited and regulations made regarding the amount of work required of the prospector. In the event that the property becomes productive, or is sold or transferred, the amount advanced by the Government should be refunded with interest. The Government should be considered part owner in the property as long as the borrower is indebted to it, and the amount of ownership should be covered by regulations. If work is discontinued by the owner, the claims should revert to ownership by the Government after three years. Examinations of properties to be so assisted should be made by Bureau of Mines engineers, preferably the supervisor or an efficient assistant, and all operations should be open for Government inspection at all times.

A plan worked out for the benefit of the prospector would result in acquiring an immense amount of valuable information especially useful in a time of emergency. This information could be published as the Bureau sees fit, and mining conditions would be further stabilized by the prevention of publicity having for its object the promotion of "wild-cat" mines.

The Platoro-Summitville District Of Colorado

By Charles S. Barnes*

The Platoro-Summitville district is one of the largest undeveloped mineral belts in Colorado, with well-defined fissure veins, carrying bunches of high-grade ore running several hundred dollars per ton. Shipments have been made to the smelteries in Pueblo and Denver. Some of the ore showed much free gold.

When the slump in silver came, and the rich surface ores changed to a medium grade, carrying considerable quantities of copper sulphides, activities began to slacken, and it was recognized by the operators that the ore in future must be milled on the properties or they would have to abandon the mines. Though large tonnages of surface ores, which were more or less oxidized and too low grade to ship, were treated in local mills at Summitville, by amalgamation and concentration, the larger part of the valuable material floated over the vanners with the tailing, and was lost.

*Mining engineer, Monte Vista, Colorado.

Despite the fact that millions of dollars' worth of gold was saved on the plates and in concentrate form in these old-style stamp mills, fully one-half of the metal in the ore was lost in the tailings. When copper sulphides and antimony were encountered in the lower workings, nearly all the valuable mineral was slimed, and so lost. Milling operations ceased to be profitable, and mills were closed.

Summitville is near the northern limits of the mineral belt, in latite-andesite formation, and, the veins being oxidized to a considerable depth, and carrying free gold, the old-style amalgamation mills were fairly well adapted to the treatment of such ores.

The southern part of the belt in Platoro district is in monzonite-diorite formation of the San Juan volcanic series and an older-lower portion of the same. It is not markedly oxidized, but shows base sulphide ores at the surface. As a consequence, there is no free-milling ore in quantity, as at Summitville, and no mills have been installed. The distance from Summitville to Platoro is about six miles in a north-south direction. There is a giant fault about midway between at the Alamosa River, near Stunner, which is the dividing line between the upper andesite and the lower monzonite formations.

There are large bodies of refractory sulphide ores in the lower workings at Summitville, and also at Stunner, Gilmore, Jasper, and Platoro, awaiting the discovery of an efficient method of beneficiation. A great deal of experimenting with various new processes in the last few years has been done, but no satisfactory method of recovery has been developed. Recently, however, tests made by flotation have shown that the ores of this district are easily treated by this method, and that a high extraction can be obtained.

Many operators are planning to resume work this summer, to repair the roads, install new machinery, and resume development of orebodies. Flotation mills will be installed at an early date, and an effort made to revive a rich mineral belt that has lain dormant for years.

Improvements on Mining Locations

By A. L. H. Street*

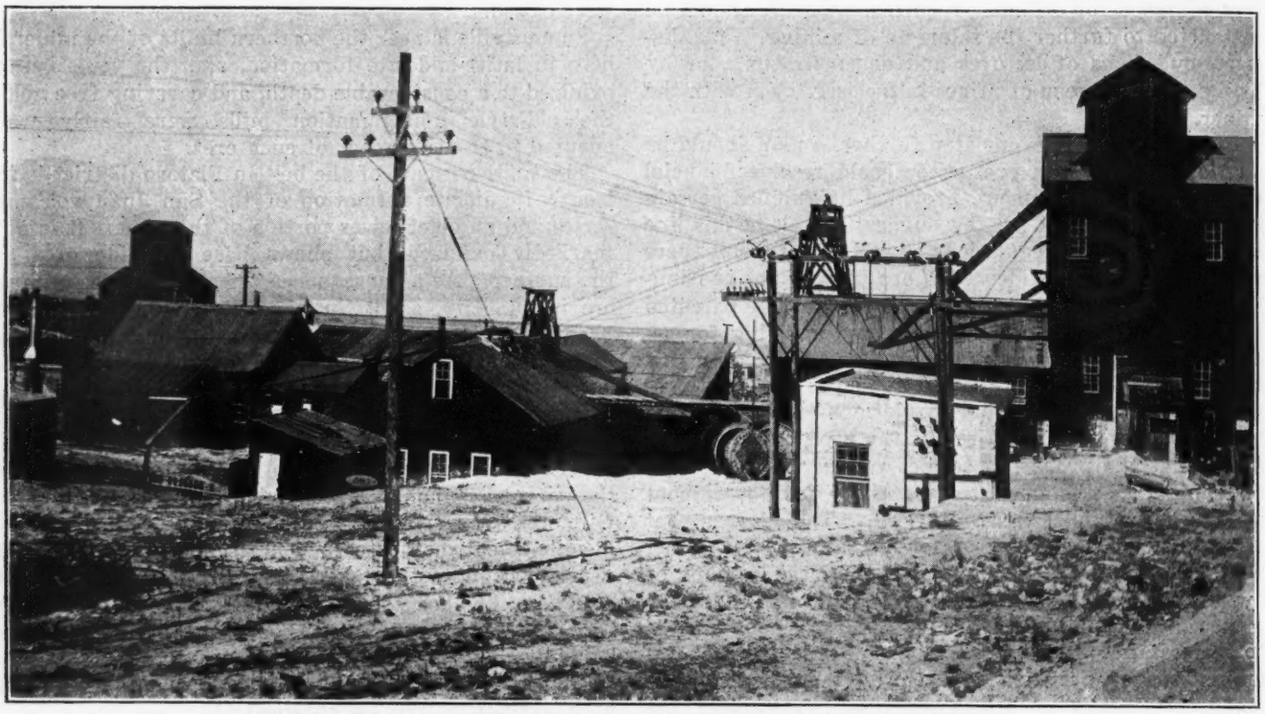
The right of the locator of a forfeited mining claim, or his assignee, to remove fixtures constructed upon the ground, as against a subsequent locator, was involved in the case of Watterson et al. vs. Cruse, (*176 Pacific Reporter, 870*), decided by the California Supreme Court.

A mines company, as owner of mill-site locations held in connection with lode-mining claims, erected a quartz mill, a dwelling house and a boarding house on the mill sites, and later purported to sell these improvements to plaintiffs, with a right of removal. The company forfeited its rights to the locations by non-performance of labor and non-construction of improvements, and defendant subsequently came into possession of the claims under valid relocations of mining claims.

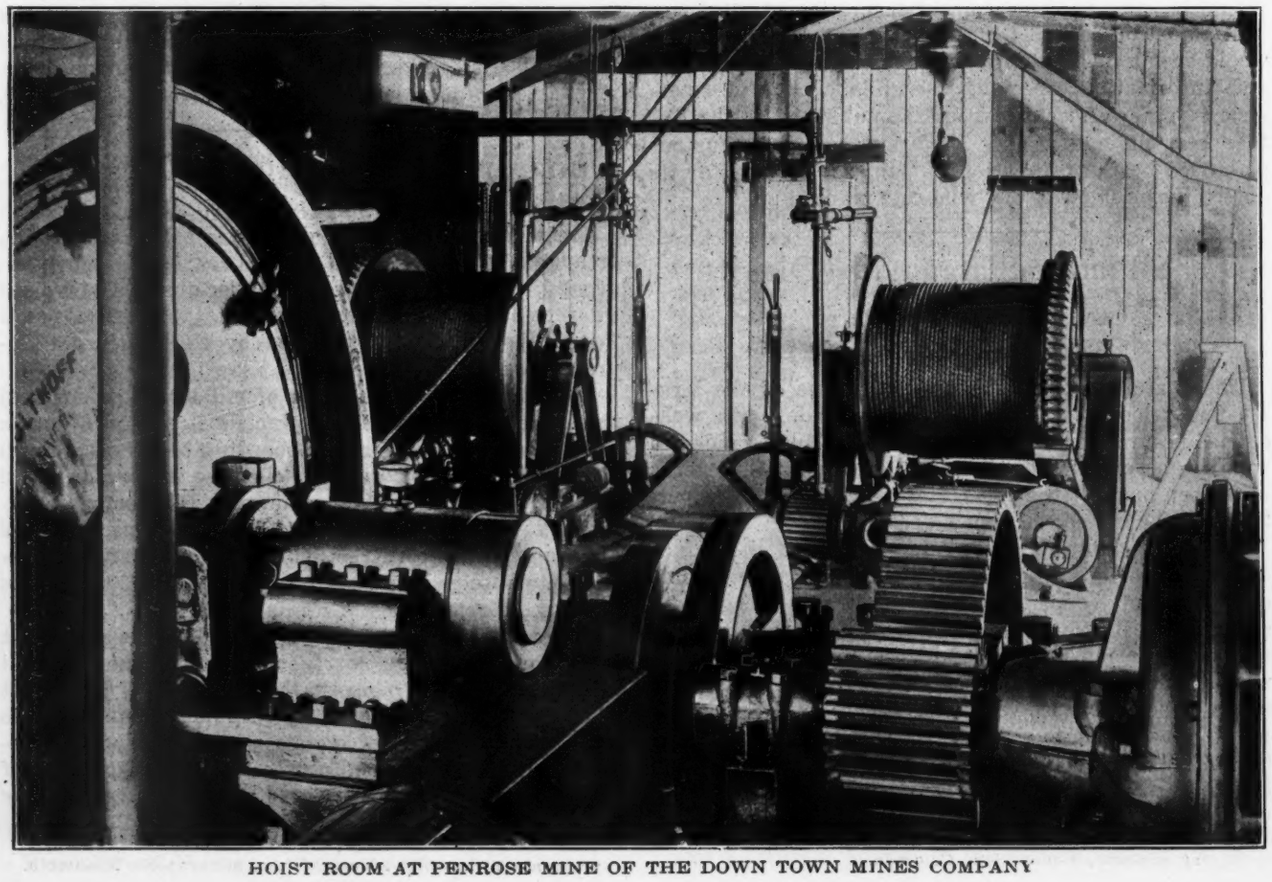
Under these circumstances it is held by the court that the plaintiff acquired no right to remove the mill and other structures as against the defendant. The court holds that where the locator of a mining claim abandons or forfeits the same, together with a mill site, a relocator has the right of possession and enjoyment of buildings and improvements so affixed to the land by the original locator as to become a part of it.

*Attorney at law, 820 Security Bldg., Minneapolis, Minnesota.

Penrose Mine at Leadville, Colorado

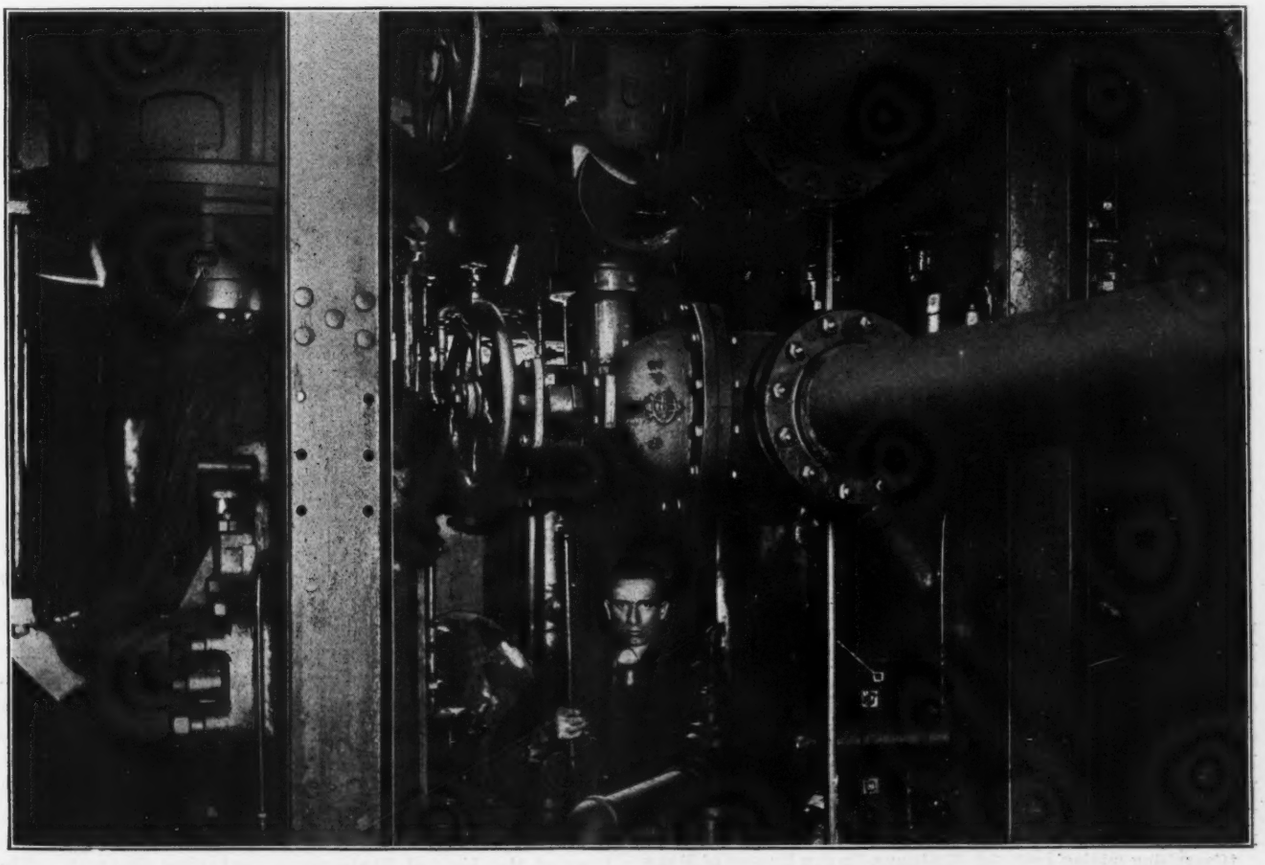


SURFACE PLANT AT THE PENROSE SHAFT, LEADVILLE, COLORADO



HOIST ROOM AT PENROSE MINE OF THE DOWN TOWN MINES COMPANY

EIGHTH LEVEL STATION OF THE PENROSE MINE, LEADVILLE, COLORADO



MOTOR-DRIVEN PUMPS ON THE NINTH LEVEL OF THE PENROSE MINE

The Position of Gold*

By H. N. LAWRIE†

The declining production of gold, not only in the United States but also in practically all gold-producing countries, has excited the interest of economists and prompted inquiry into the significance of the annual gold production in relation to international trade. The increase in the cost of producing gold, the position of the United States as a creditor nation, and the fact that stimulation of trade will be of marked benefit to the mining industry are astutely discussed by Mr. Lawrie.

THE economic situation has been changing rapidly, and it is difficult to account for changes which are momentous and have a serious bearing upon the solution of problems of the present and of the immediate future. The better to analyze the situation, I have prepared some gold-production charts.

In 1915, the high point of the production of the world's gold was attained, $469,000,000 being credited to that year. The decline in gold production has since been rapid. The percentages of reduction of output in the last three years with respect to the production of 1915 are as follows: The total decrease in the world's production is 20%. The curtailment for South Africa was only 6.4%. The fact that the decline in South African production was so much less than in the total world production arises through South Africa being more remotely situated from the center of economic pressure. The operators of South Africa had probably accumulated large food and equipment supplies, which postponed the necessity of making purchases in the higher-priced market which followed. Another factor which may account for this condition is the improvement in recovery in the treatment of South African ores, which has tended to compensate for the economic conditions that have been so universally oppressive to the gold-mining industry generally.

In Australia, a country which was no less remote from the center of economic pressure, but in which the resources of the gold mines are becoming rapidly exhausted, there has been a continuous decline for the last three years, totaling 45.5%. The decrease in output in Canada is 26% for this period of three years; in British India, 13%; and in Rhodesia, 15.8%. The entire decline in the gold production of Great Britain, including all of her colonies, amounts to $46,000,000 for the same period, and represents 15.4% of the total production for 1915.

In the United States the drop in production is 32.2%.

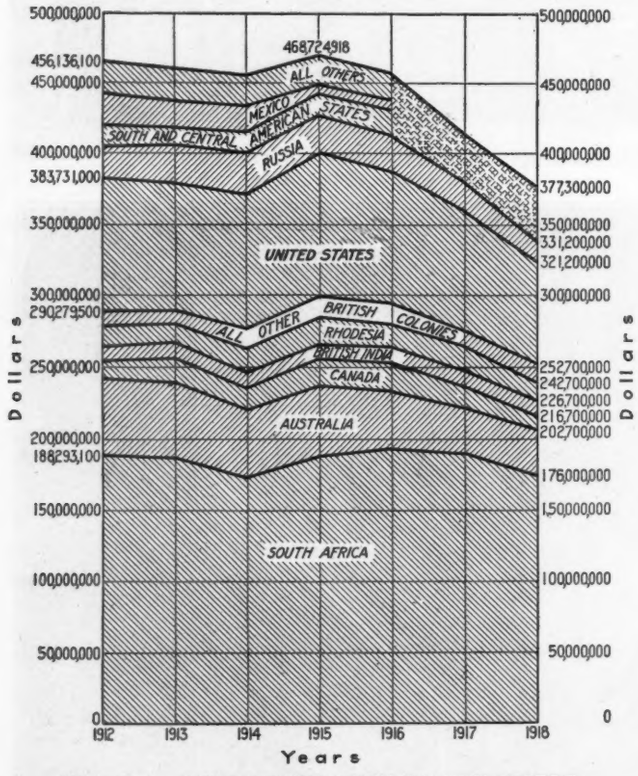


CHART 1. GOLD PRODUCTION OF THE WORLD

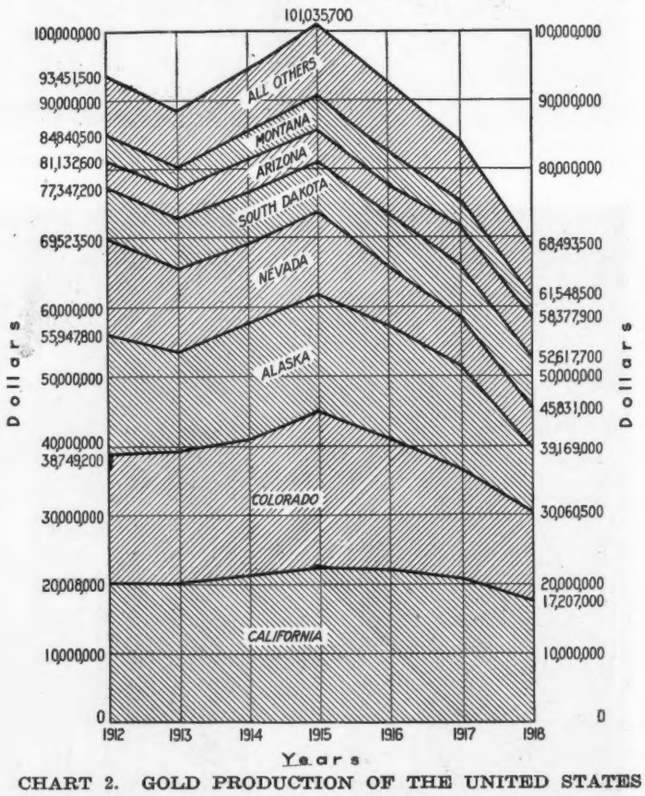


CHART 2. GOLD PRODUCTION OF THE UNITED STATES

Of the total decline of $92,000,000 in the world's gold production, that in the production of the United States accounts for one-third, or approximately 35% of the total, whereas normally the gold mines of the United States produce one-fifth of the world's gold output. This denotes the extreme economic pressure to which the gold-mining industry of the United States was subjected on account of the existing international situation and reflects the volume and rapidity of the financial mobilization of the United States upon entering the war. The

*The revised notes of an address delivered at the International Mining Convention, Vancouver, B. C., Mar. 18, 1919.

†Consulting mining geologist, Chairman Oregon Bureau of Mines and Geology Commission, Oregon Bldg., Portland, Oregon.

effect was much more acute here than it was in some other countries that had felt the pressure from the beginning in 1914.

Russia naturally shows the effect of disorganized government. The Russian decline in gold production is 62% for the last three years, a drop from $26,000,000 to $10,000,000, and this indicates more eloquently than anything else the effects of Bolshevism.

The South and Central American states show an increase of 5.3% in gold output, and it is altogether likely that some of that gain has been attained by the increased recovery of byproduct gold from the treatment of copper ores. The Mexican crisis in gold production occurred in 1915, and happened to coincide with the year

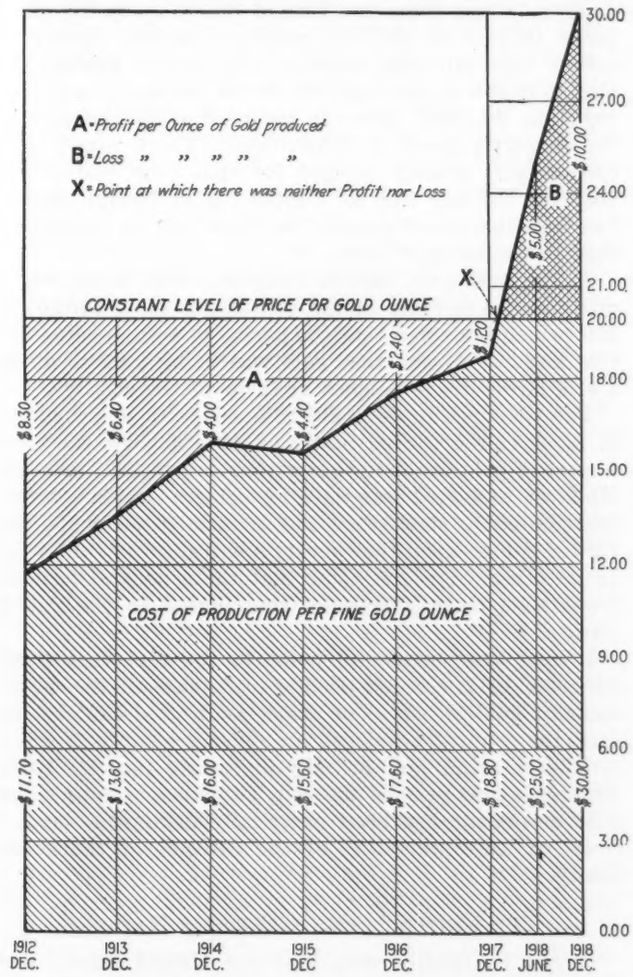


CHART 3. WAR INFLUENCE ON THE COST OF PRODUCTION PER FINE GOLD OUNCE, TYPE EXAMPLE

in which the high point of the world's gold production took place, and it is evidence of the chaos in which the Mexican government found itself at the beginning of the revolution. The production was a little over $6,000,000 in 1915, and in three years it has increased to $10,000,000, a gain in output of 66%. All countries of the world not heretofore mentioned show an aggregate decline in production of 4.2 per cent.

To analyze the situation of the United States more carefully, I have prepared a chart on exactly the same principle as the world-production chart and covering the same years, from 1912 to 1918 inclusive. California is shown by the chart to have just about maintained its production ratio to that of the United States, in a somewhat similar manner as South Africa maintained its production with respect to the world, notwithstanding the fact that the economic pressure was so severe in the United States. This may be accounted for because of the fact that much of the Californian output comes from placer mining, in which labor is not as large a factor in the cost of production. Labor was also not as difficult to procure in California, because it was rapidly drawn from the interior states to the seaboard for other industrial purposes. The decline in California gold production is 23.7%. In Colorado the decline is 45%. This marked variation in ratio is due in part to the difficulty in obtaining labor and also to the complexity of ore treatment in Colorado, which involved the use of chemi-

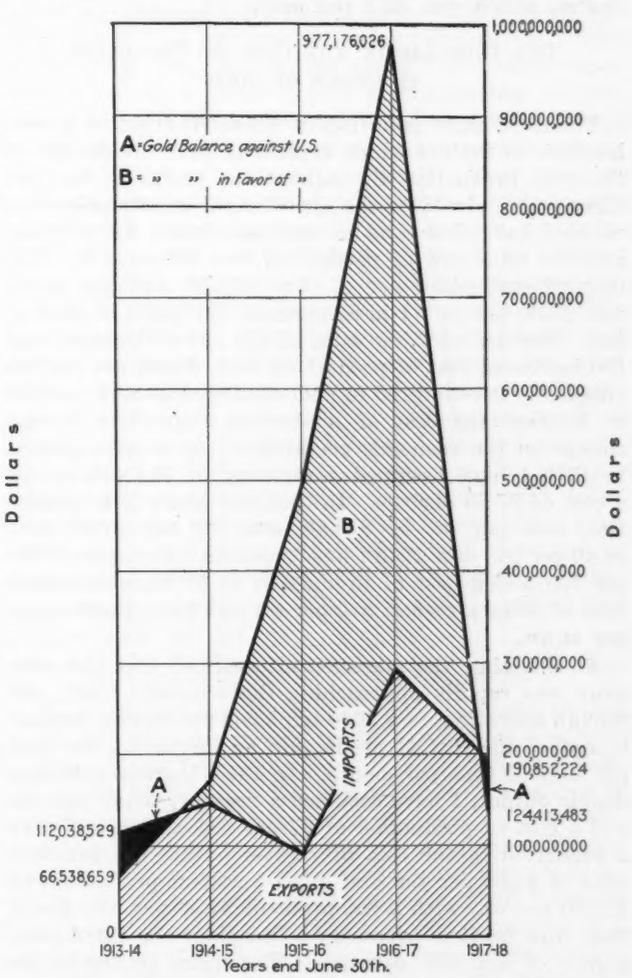


CHART 4. GOLD EXPORTS AND IMPORTS OF THE UNITED STATES, 1914-1918

cals, the price of which advanced rapidly as the war progressed.

In Alaska there is recorded a decline of 45.5%, which corresponds exactly with the decline of Australia, and it can be accounted for not altogether by the economic pressure, but also by the closing down of the Treadwell mine, which was an important factor in contributing to the Alaskan output. Nevertheless, the decrease in production since 1917 shows the tremendous effect of the war on Alaskan gold mining.

In Nevada the decline of 44% in gold output was due largely to the complex treatment of the ores of that state, and the fact that its mines are situated far from the coast, thereby making labor difficult to retain.

In South Dakota, the Homestake mine, which is well developed and has a large reserve of homogeneous ore, was able without difficulty to maintain the normal output. The production of this mine contributes by far the larger portion of the gold output of South Dakota, and the decline for this state was only 8.3 per cent.

The copper production of Arizona has expanded rapidly in the last three years, and to that expansion must be accredited the increase of gold output, in the period under review, of 26.4%. Montana recorded a decline of 36.3%, and all of the states and dependencies of the United States, not before mentioned but combined, show a loss of 33.4%, which corresponds closely to the general loss for the entire production of the United States, which was 32.2 per cent.

The Increase in the Cost of Producing an Ounce of Gold

The third chart is devised to show the effect of a combination of factors which explain in part the decline of the gold production throughout the world in the last three years. In 1912, the hypothetical quartz gold mine which I have chosen as an example yielded $12 per ton, and the total cost of production was $7 per ton. The cost of production per oz. was $11.70, and the profit was $8.30 per oz. I have assumed the price of gold at $20. The depreciating value of the ore with depth, and the increased cost of production with depth, are factors frequently encountered in gold mining, and both operate to increase the cost of production regardless of any change in the economic conditions. As a consequence, in 1913 I have assumed a recovery of $11 per ton at a cost of $7.50 per ton. In this case there is a production cost per oz. of $13.60, and the net profit was $6.40 per oz. For 1914 I have assumed a recovery of $10 per ton and a cost of production of $8.50, which combine to make a cost of $16 per oz. and a net profit of $4 per ounce.

At this time the management realized that the company was rapidly approaching the economic limit, and though operating on a 3000-ton basis per month, decided to reduce the cost of production by increasing the output to 6000 tons per month. In 1915, therefore, with a double output, I have assumed a recovery of $9 per ton and a cost of production of $7 per ton, which indicates a reduction in the cost of recovery from the previous year of $1.50 per ton and gives a cost of production of $15.60 per oz., with a net profit of $4.40 per oz. From that time on it is necessary to consider the third component of economic pressure. The sharp decline in the purchasing power of the dollar, both with respect to labor and material, began to be felt. This was attributable to the fact that the country was under a severe pressure to obtain war materials at a rapid rate, which forced an expansion of credit and corresponding inflation of currency. These factors combined to cause automatically a rise in commodity prices. The economic pressure became intense in 1915, and in 1916 the cost to produce 1 oz. of gold was $17.60, and the net profit per oz. had fallen to $2.40. In that year the recovery was $8.50 per ton and the cost of production had increased 50c., to $7.50 per ton. In 1917 the same amount of $8.50 was recovered per ton, but the total cost of production had risen 50c., making it $8 per ton and the total cost per oz. was $18.80, leaving a profit of $1.20 per oz. In June, 1918, six months later, the total amount recovered was $8 per ton and the total cost of recovery was $10 per ton, provided the mine had continued operation. Many properties shut down at this time, which was wise business policy. In June, 1918, there was, therefore, a total production cost of $25 per oz. of gold, which it is apparent would have made a net loss of $5 per oz. In December, 1918, six months later, the assumed recovery is $8 per ton and the cost of operation had risen to $12 per ton, an increase of $2 per ton over the cost in June. Had the mine continued to operate in December, 1918, the cost of producing an ounce of gold would have been $30, or a net loss of $10 per ounce.

Gold Exports and Imports

The last chart, No. 4, shows the gold imports and exports to and from the United States from the fiscal years 1913-14 to 1917-18, ending June 30. The year ending June 30, 1914, shows a gold balance against the United States of $45,000,000, but in the next year, ending June 30, 1915, there is recorded a gold balance in the country's favor of $25,000,000. There would have been a still greater amount for that year had it not been for the fact that all United States foreign securities were liquidated against the trade balance which was then in the nation's favor.

In the next year, ending June 30, 1916, there was a gold balance in favor of the United States of $404,000,000, which indicated that the period of security liquidation had ceased and that gold was being paid to offset a still larger trade balance in favor of the country.

The year ending June 30, 1917, shows a gold balance in favor of the United States of $685,000,000, the total import of gold for that year amounting to $977,000,000. Much of this gold was paid by neutral nations, which contributed to strengthen the financial position of the United States upon the country's entrance into the war. In no other way is it clear that these neutral nations could have more effectually contributed to the Allied cause.

I want particularly to point to the fact that from June 30, 1917, a rapid decline took place in the movement of gold either to or from the United States. In fact, the country developed an adverse balance of $66,000,000 in actual gold in the year ending June 30, 1918, America's first year of the war, and since that time the gold movement has been practically negligible, on account of the uncertainty of the outcome of the peace treaty.

The United States a Creditor Nation

It can be readily seen that the United States has become, by having liquidated its obligations in foreign countries, by having negotiated loans, and by having so large a gold reserve in custody, a creditor nation. And it is important that the world be informed as to what attitude it may expect the United States to assume because of the tremendous responsibility that has been thrust upon the country by the war. But before going into the matter of international trade and commerce, I would like to call attention to a condition which now exists, and which is based altogether upon a misconception as to what may be expected of commodity prices in the next two years.

Some persons have assumed that prices are bound to drop, and are waiting to see what the trend of prices will be before they expand production. The result of this tendency to withhold investment has created a condition of stagnation in development which is just as

artificial as were some of the tremendous gains made in commodity prices due to the erection of economic barriers and the imperative war demand. Had the nation at this moment concluded the period of readjustment and new construction, it might expect to be able to contract the currency, but it has not yet reached that period, and must still expand its credit structure and correspondingly expand its currency to meet that exigency.

The Policy of Marking Time

Temporarily, while the American people are "marking time," waiting for the peace treaty to be adopted, the door of international commerce has been closed. For that reason commodity prices in this country have dropped slightly, but they will increase because of the fact that the nation must still expand its currency and credit. For the enlightenment of the gentlemen who are waiting, and the municipalities which are waiting, and of the provinces and states that are waiting for lower prices—in behalf of all to whom it seems conservative to wait—it is expedient to consider what will result from that watchful-waiting policy.

With the signing of the peace treaty there will be a tremendous demand for the delivery of a great variety of commodities to the European countries. Those who have waited will find themselves in the same market in competition with this great demand to obtain delivery of their equipment. Aside from the delay, however, they will have passed through a period of high prices, and should be able to pay what little excess of price is now demanded for their equipment.

When the foreign demand arrives, it will receive precedence of delivery over domestic requirements for the same products. And why should this not be so? These devastated countries of Europe are entering upon a period of reconstruction that is altogether vital to their existence, and they should have the first command of all needed materials. And American industry, should, therefore, be prepared to place its orders during this present period, when the domestic demand may be met without conflicting with foreign delivery.

This condition reminds me of the fact that, generally speaking, industrially America is "marking time" at a moment when the country should be "going over the top."

The boys in France were not ordered to "mark time." They were commanded to go "over the top," and they are returning better citizens and more capable men to assume the responsibilities of their country's new constructive industrial life. They do not want to take part in "marking time" at home. They are not looking for charity. They are not expecting anything but an opportunity to enter upon a most progressive program of new development. And why not? They have seen too much activity to be willing to take part now in any program which is not progressive.

Among the various developments that could be made, the mining industry is one of the best and most promising in which the men now released from military service may participate. In times of peace the mining wage has always been the top-notch wage. There is not a cleaner business and there is not a business in which they can engage with more enjoyment, because of its outdoor life, than the mining industry. I believe this convention is well-timed to have a most marked effect in accomplishing a satisfactory result in expanding the mining industry. To the people of British Columbia is due the credit for having recognized the necessity for allocating to the mining industry its proper place in the general and progressive development of the domestic program.

The International Situation

In reviewing the international situation, I will be frank. This is no time to withhold the truth. The future of the United States depends largely on the ability of the citizens of the country to form a right conception of the truth and to act in accordance with it.

In the matter of international trade, I have said that the United States has become a creditor nation. The United States has always, as a nation, expressed an advanced enlightened self-interest in its international relationships. I do not wish to convey the idea that there is anything altruistic in the plans which have been formulated by the economists and financiers of the United States concerning the future, but I want to call attention to the breadth of vision shown by these gentlemen.

The country has goods abroad and is unable to get them home; and must, therefore, do certain things to offset this condition. It will be necessary to educate the American people, and it will likewise be necessary to educate the people of Canada to the need of absorbing the investments of foreign countries in Canada and the United States. Why? Because foreign countries with which both Canada and the United States wish to trade have not gold to deliver. They have not goods to deliver, because their industries are paralyzed and the trade balance is against them. To draw on the currency in circulation would cripple their internal financial structure. With what will they pay? They have nothing with which to pay until a broad policy has been developed to absorb in the United States and in Canada the industrial securities of those countries in order to offset this adverse trade balance.

Exchange Rates and Gold Embargoes

The great variation in commodity prices in the United States has been due largely to the erection of economic barriers. Price fixation by government is always a temporary artifice. It met the requirements of war, but it does not meet the requirements of peace. These artificial barriers must be eliminated. Let the good old immutable law of supply and demand govern the situation. While, during the war period, these economic barriers have been erected as a matter of domestic policy, in a large measure similar barriers have been erected internationally. What is the result? The United States put an embargo on gold and has been paying a premium of 7% to obtain a draft on Buenos Aires. The Canadians know that they have been paying 2% exchange on account of the fact that they put an embargo on gold, and this simply represents a physical difficulty in making the exchange. This 2% is a penalty on both imports and exports and is chargeable against the going industry of Canada.

More money will be needed for industrial development and improvements, and I am wondering if it will not be found advisable to consider whether the influx of capital which is desired and which it is necessary to have would not greatly offset any advantages of maintaining such an embargo on gold. It is evident that this large volume of capital will not be so likely to invest if the penalty of 2% is allowed to continue. This argu-

ment applies to every country. The future course of trade will be much hampered until the proper action is taken to remove the embargoes on all products. I hesitate to use the words "freedom of trade," because I might be misunderstood, but I mean that condition of trade which imposes no burden upon the transportation of products between any two countries in the world.

It is alarming to consider what some of these exchange rates have been and are now. George E. Roberts, of the National City Bank, says in a recent publication that "it has been necessary to pay as high as 50% premium for a draft on Spain, and in Italy it has been necessary to pay a premium of 100% for a draft on New York. In Paris today it is costing about 5% to obtain a draft on New York, and it has been as high as 10%. In London a New York draft costs about 2%, but it has taken constant lending by this country for the last two years to hold it down to that point." This more favorable exchange rate may also be due partly to the fact that 62% of the world's gold output has been continually flowing to the British Exchequer to enlarge the gold reserve.

Freedom of Trade and the Mining Industry

The first condition that is going to assist the gold-mining industry is freedom of trade, which is premised upon the resumption of a sound financial relationship with foreign countries. The demand for American and Canadian materials in foreign countries is great. As evidence of this fact the companies which are holding copper at the present time, and carrying extensive margins in order to hold it, must have certain knowledge of a foreign demand which will soon materialize and absorb their product. The effect of putting gold on the open market would be to give the gold miner what he justly should have, and I wish to emphasize the fact that while other metals have dropped gold has been at a constant level of price. That is an excellent omen. Some people have held the opinion that there is not gold enough to satisfy the country's present much inflated monetary system. Others would seek relief through bimetallism. It has yet to be demonstrated that there is not gold enough, provided the necessary precaution be taken to maintain the normal output and to insure proper distribution of the metal. Bimetallism would not only not minimize the difficulties but would not be acceptable to the nations which must redeem their debts on a gold basis and which have the greatest obligations to meet.

Most of the nations of the world are on a gold basis at this time, and other nations will find it necessary to adopt the gold standard, in order that they may be able to speak in the same language as that of the majority, and they will necessarily have to adopt the same monetary vocabulary. The fact that the British pound, through more than a century of international commerce, has won for itself an unparalleled reputation for stability would indicate that Great Britain would not accept any proposal to tamper with the gold standard. The United States in a similar way through years of honest finance has won for the unit of its monetary system, the gold dollar, an enviable reputation for its stability in international trade. Likewise the United States would have everything to lose and nothing to gain by considering a change in the gold standard. Gold is the only least common denominator by which the costs of war and the costs of reconstruction, in terms of pre-war standards, may be accurately measured, and gold will remain the unit by which all debts will eventually be liquidated.

I find in analyzing the various systems that have been made by economists that those people who believe that the country's debts ought to be repudiated and its gold standard changed are far from the fact. The ship must be held to the shore.

So far as I can see, the extension of Bolshevism is one of the menaces with which civilization is confronted, and this "marking time" on new investments is not setting a back-fire to Bolshevism. The best back-fire to Bolshevism is to create a condition of employment that is universal and to allow a margin of profit which represents a good living to labor. The Bolshevists are operating with a draft that is being blown by their own bellows, and it does not get them anywhere. Even in their ranks the radical of today becomes the conservative of tomorrow.

The A. E. F. School of Mines

The newest American school of mines is at Beaune (Côte d'Or), France. Nearly 20,000 U. S. Army students (officers and enlisted men) are now in attendance at British, French, and American universities in Europe—approximately 2000 to British universities, 7000 at French universities and about 10,000 at the American university, started about three months ago. and having more students than many institutions of learning that are musty with the dust and mold of centuries. *"Tout à fait américain,"* the French say The American E. F. University was established for those members of the American Expeditionary Force who are being held in Europe to await the outcome of the Peace Conference—men whose education was interrupted by the war, or who have chosen to take post-graduate work while awaiting Germany's decision. The American E. F. University was established at Beaune because one of the American large base hospitals had been there, and the buildings were practically ready for students and professors to step into, when the Army Education Commission decided to take over the Y. M. C. A. plan for the education of the men during the waiting period. Incidentally, it may be mentioned that model post and divisional schools are being conducted at Beaune, as well as the college work. The American E. F. University being in the Côte d'Or (Golden Slope), it would seem to be an ideal place for a school of mining. This thought is further confirmed by the fact that Beaune is in the center of the old Province of Burgundy, the sparkling product of which inspired many students in American universities before the spectre of aridity arose to cast its somber shadow on student days. As may be imagined, Beaune is not a prohibition town; and yet report has it that 10,000 students are there, and none is in the gutter, notwithstanding that the students have the freedom of the town. But perhaps their previous training in France accounts for this. The Côte d'Or derives its name not from the gold in the hills but from the richness of its vineyards. This does not detract from its qualifications as a site for a mining school, for it is within easy reach of the principal French iron mines and of the southern coal mines, and is less than 40 km. from the famous Creusot metallurgical works. The school of mines is officially known as the Department of Mining, College of Engineering, American E. F. University.

Correspondence and Discussion

Conditions in Sonora, Mexico

Arrived back from the land of cacti and mescal last evening, after two busy weeks in that country of sunshine, rattlesnakes, and rocks. I did not write from there, because I feared that the little I might have to say would not get across the line and that my efforts would be wasted on the desert air.

Let me see if I can give you an impression of what I saw and felt in Sonora. Quiet, yes; but the quiet of death, rather than that of peace, broods over much of the state. "Things are looking up quite a bit" is the reply one gets from almost every man, but this comes from the feeling that things are about to be done rather than that anything new has been started.

Perhaps it was unfortunate that my stopping place was La Colorada, the town at the property of the Creston-Colorada mine, the Minas Prietas, and the Butters cyanide plant, all owned by the Mines Co. of America. An hour's visit to this property, and the stockholders would understand why their stock is worth minus $1 or less per share. It may be well to recall that the State Department advised at one time that all Americans withdraw from Mexico. I think it was when the Vera Cruz incident occurred. The Americans from Creston-Colorada were sent away, and the company, to retain and maintain its force, put all the married men, nearly a half of the crew, on as watchmen on twelve-hour shifts.

There was considerable friction between state and company officials about this time. The company was ordered, I understand, to put back all men on eight-hour shifts, but it discharged practically all of the men. The state then said, "When a mine is not worked by the owners it may be operated by any one"; in other words throwing the mine open to looting by miners, so that not only the mine but all of the plants have been much damaged. Underground, all pillars that contained ore worth packing out have been destroyed, and caving naturally resulted. Not satisfied with this, the pillagers set fire to the shaft sets, and they were burned to the surface. The mines are a wreck; $1.20 silver will not reopen them. The remaining ore was rather low grade, and if it were physically possible to open the property, it could probably not be done for less than $500,000. Above ground, the wreck has been no less complete, though the buildings have not been destroyed by fire. Brass and copper were the first to go. Not a nut, valve, rod, or rivet is in evidence. And so far as cold chisels could reach the copper on the motors, they too were wrecked.

The cyanide tanks were all utilized as fire wood, and carboys made good marks to shoot at. It required considerable work to get out some of the heavy bearings, but so long as the task was that of destruction, the destroyers did not care—they seemed glad to work.

There is not an engine, pump, motor, or other piece of machinery or equipment in the camp that could now be put in operation for less money than it cost originally. Corrugated iron, windows, doors, and even the framing of the buildings have been carried off. As I walked through one of the old mills, I found a man, a woman, and two boys busy getting firewood with a crowbar from the mill floor. I believe that there was still quite a little of the ore in the tailings that could have been cyanided again, and would have been, but it's *"hasta mañana"* with those tailings now. Our State Department was at fault primarily, and then Mexico, or the State of Sonora, was equally culpable.

Soldiers and citizens have been equally destructive, and always the Mexican soldiers have been camped here to preserve order and keep off the Yaquis. Sometimes there was nothing with which to pay the soldiers, each one's pay for a day being equivalent to the hide of one cow. This was quite easy while the stock in the neighborhood lasted. Steers and cows were driven in and slaughtered for their hides, and the poor people got what meat they wanted and the buzzards took the remainder. The country in that section is now destitute of cattle, and wanton destruction is evident on every hand. These people had never heard of Bolshevism, but they practised it to the queen's taste.

Lying to the east of La Colorada and for a considerable extent north and south, there is a section of eastern Sonora that is almost prosperous. This section is north of the Yaqui country, and yet the Yaquis go there for cattle, clothing, and food when they need them, and they have the reputation of infesting the country.

All of the time we were in La Colorada, there was continued talk of the depredations of the Yaquis. How much truth or falsehood the stories contained we could never learn, and the Americans are equally ignorant of what is going on around there or, rather, of *who* is doing the dirty work. There are several operating properties, and more would be working if they had reasonable protection. The Mexican government has plenty of soldiers there, but, as in the oil country, it would be a blessing to the country if they were taken away. They protect nothing and themselves indulge in pillage.

Here is a sample of the stories coming in over the telephone on the morning of May 10:

First report: A band of Yaquis attacked a Mexican camp; 32 Mexicans killed.

Second report: Eighteen Mexicans killed; 2 Yaquis killed.

Third report: Six Mexicans in the camp with two women, no one killed; Yaquis got one of the women.

Fourth report: Six Mexicans with two women in the camp. Three Mexican men killed and 11 Yaquis killed.

The freighting into this country is done by trucks driven chiefly by Americans. They said nothing much about hold-ups while they stopped with us at La Colorada, and started out armed to the teeth.

The American boys have no fear of the Yaquis; in fact they do not think them responsible for any of the devilment, but attribute it all to the Mexicans. A few days after we were there, H. S. White, one of Schroeter's men, started in with a truck load of stuff and was

shot with his Mexican helper, the murder occurring east of La Colorada. There is no warrant for assuming that the Yaquis were responsible, all the evidence leading to the conclusion that Mexicans were responsible for the outage. A well-informed and prominent Mexican gave me this story: A general wrote him recently that Sonora troops had been ordered by Carranza to go into Chihuahua to attack Villa. But in the letter he said "I don't think we will have to go." Now, the Yaquis will shoot up the Mexicans every time they get a chance, but not Americans, and no fuss is made when they shoot Mexicans. If an American be shot, some notice of the act is taken in Mexico City and the Sonora troops are ordered to stay in Sonora; hence they don't have to go into Chihuahua.

I was out one day on the Yaqui trail in the care of a local Mexican. He sent men out the day before "to clean the brush from the trail." After coming away from the mine, I found they had been posted on neighboring hills while I was at work. This Mexican was surely afraid of the Yaquis.

Here in Nogales and Tucson the idea prevails that the United States will have to occupy Sonora sooner or later. The most reasonable scheme that I have heard came from a Nogales man yesterday. His idea was that when the trouble in Europe had subsided, England and France would demand action over here. The United States would assume all Mexican debts, and take a mandate for Mexico until those obligations were discharged, by which time Chihuahua and Sonora and perhaps other states would be so thoroughly Americanized that they would ask for admission to the Union.

The Southern Pacific in Sonora is doing a good business, both in passenger and freight. It runs a passenger train every other day, carrying three or four coaches, well filled. On June 1 the company will put on a daily train, and on the same date a Pullman will be added, the first since trouble began in this country. Now, the Pullman people are said to be very careful and take no risks in Mexico. This is an indication that they think that their cars will be safe and useful down there.

However this may be, with every freight train south of Torres comes one or two armored cars full of rifles. Yesterday on the way up we carried a car full of rifles all the way through with us. Why troops are carried I do not know. Whether it is just to give jobs to colonels or major generals or whether some trouble is feared, I do not know. But of one thing I am certain: to the man traveling through the country, armed soldiers on every hand do not give the impression of peace and order. Politically, Sonora is somewhat separated from the other states, and her governors count for more. They have just tried to have an election. Two parties claim the election, each calling the other grafters. And so far as I can understand, the biggest grafter is going to pull the thing off as he wants it to happen.

Nothing except American money circulates in Sonora. Mine taxes must be paid in gold, which sometimes goes to a premium of 10%. One must buy it at the banks. Government officials sell it back to the banks and then one must buy it again so as to be able to pay taxes. It is necessary to go to one window in the Federal building to buy Mexican money, and then take it over to another window to buy stamps or send telegrams. Only for these three purposes does one handle Mexican money.

Labor is fairly plentiful at some points, and scarce at others. At one mine producting 25,000 oz. silver per month, the manager told me that his various taxes about equalled his payroll. He is leasing the mine, and the government gets more out of it than does the owner.

My general impression is that it is a better time to buy than to operate mines or ranches in Sonora. Conditions are surely not so bad as they have been, but they are still far worse than before the war, with no prospect for rapid improvement. F. F. SHARPLESS.

Nogales, Ariz., May 24, 1919.

Army Gas Masks

I am greatly interested in the article on "Army Gas Masks" which appeared in the Apr. 19 issue of the *Journal*. The Fire Department of this city has several of the masks in use, and finds them entirely satisfactory in smoke commonly encountered in burning buildings. When the chief bought the masks he asked where he could buy the material to recharge the canisters when they become exhausted. The man who sold the masks promised to send him the address of the people who handle the coconut charcoal and "purple" soda lime, but he failed to do so, and up to this time the chief has been unable to find where to buy it.

Will you kindly send me the address of some one who manufactures or handles the material with which to recharge the canisters? SAMUEL MORTHLAND.

156 W. Main St., Decatur, Ill., May 2, 1919.

Inquiry by the *Journal* concerning the utility of the Army gas mask in fighting fires elicited the following additional and pertinent information:

Replying to your letter of May 6, regarding the use of Army gas masks for working in smoke in burning buildings: There is an element of danger in using the Army mask for this purpose, because of the possibility of carbon monoxide being present in the products of incomplete combustion. The Army mask will remove particles of smoke, tar, and irritating vapors present in smoke. It does not remove carbon monoxide. Smoke produced in small smudge fires and where there is opportunity for dilution with air seldom contains more than 0.1 or 0.2% carbon monoxide, and under such conditions the Army mask is useful in protecting men from the choking effect of smoke. The Bureau has made actual tests, in which men wearing the Army mask remained in dense smoke, produced from damp wood and straw, for a period of ten minutes without discomfort. Army masks have also been used successfully in fighting forest fires.

It is, however, entirely possible that conditions may develop in burning buildings under which the fire gains headway in a room and burns out the supply of air, so that further combustion takes place with restricted ventilation, thus producing a condition favorable to the production of carbon monoxide. Five-tenths of 1% of this gas in air will render a man unconscious in a few minutes. The gas is insidious, gives no warning, and does not irritate the air passages, so that a man simply sinks down unconscious without warning. Herein lies the danger in the use of a gas mask for working in smoke in burning buildings. In probably nine cases out of ten, there would be no carbon monoxide, and the mask would give good protection, and would prove a valuable appliance.

Recently, the Bureau's chemists at the Pittsburgh Station made a test in a 1000-cu.ft. gas chamber in which some waste rags and excelsior were ignited and then dampened, so as to smolder, and kept in this condition for a period of three hours. At the end of this time, a sample of the atmosphere in this closed chamber was taken and analyzed, and 1½% of carbon monoxide was found. A sample was drawn through a gas mask canister, and then through a large bottle, in which a canary bird was placed. The bird was immediately overcome by the gas from the chamber, although the visible smoke particles were all removed by the canister. This proves that conditions may arise in which the gas mask is useless.

Just how often firemen meet dangerous conditions is a question for statistical investigation. It would, of course, be much better for them to rely upon the half-hour type oxygen breathing apparatus. This would give positive protection under all conditions. The only known commercial manufacturer of coconut charcoal in this country is the National Carbon Co., of Cleveland, Ohio. Purple soda lime was made by the Chemical Warfare Service of the Army. The purple color was due to permanganate, a constituent which is not necessary for gas masks for industrial purposes. White industrial soda lime is being manufactured by the Mine Safety Appliances Co. of Pittsburgh.

VAN. H. MANNING,
Director, Bureau of Mines.

Washington, D. C., May 15, 1919.

I referred in my previous letter to the fact that the relative occurrence of dangerous amounts of carbon monoxide in the ordinary fires combated by firemen was unknown and that it was a matter for further statistical investigation. Some of the prominent fire chiefs in the country are taking the attitude that though in a certain small percentage of cases there may be grave danger from carbon monoxide, yet today they are taking these chances without the mask, and, further, that the mask would be of tremendous value in a majority of their fires. Under these conditions they are inclined to feel justified in using the mask as a general protector against smoke, taking the chances that must come under certain conditions. If they do this with the knowledge that a certain percentage of the cases must be dangerous, I do not know that the Bureau is justified in taking any further step than to call attention, as we have done, to the fact that the mask is a protection against smoke particles, but will not protect against carbon monoxide which may be present in certain smokes and fumes arising from fires. VAN. H. MANNING,
Director, Bureau of Mines.

Washington, D. C., May 23, 1919.

Copper Slag Research

To C. G. Maier and G. D. Van Arsdale are due the thanks of the copper-smelting fraternity for the publication of their very thorough work on Copper Queen slags. At the plant of the Tennessee Copper Co. some years ago we tore down a settler, and found several masses of white metal between the bricks. Converter slag had never been poured into this settler, and the furnace had been smelting during this settler campaign ore charges making only a low-grade matte. Maier and Van Arsdale now give us a scientific explanation of this peculiar circumstance.

Can some one explain the violent action that takes place in a settler when cast iron is dropped in it? I append a panning test I made on Cananea slag:

"A composite sample of settler slag taken June 4, 1907, from all the settlers at a time when no converter slag was being poured, assayed 0.50% Cu, and 200 gm. of this slag crushed to 20 mesh was panned to 9 gm., which assayed 1.10% Cu. Recovery, 9.9%. Then 200 gm. of this slag crushed to 60 mesh was panned to 10 gm., which assayed 1.33% Cu. Recovery, 13.3%. A sample of settler slag obtained the same date when converter slag was being poured assayed 0.54% Cu, and 200 gm. of this slag crushed to 20 mesh was panned to 13 gm., assaying 0.77% Cu. Recovery, 4.27%. Then 200 gm. of the same slag crushed to 60 mesh was panned to 13 gm., assaying 1.06% Cu. Recovery, 12.76 per cent." GEO. A. GUESS.

University of Toronto, Toronto, Canada,
May 15, 1919.

Wages at Bisbee, Arizona

In the May 17 issue of the *Journal*, p. 877, an extract is printed from the "Monthly Labor Review" of April, 1919, on wages and labor conditions in gold mining, and in that article a table of rates of wages was given. In so far as the Phelps Dodge Corporation is concerned, eight of the twelve quotations of wages are incorrect.

I am sending you a copy of a letter I have just written to the Department of Labor, containing the corrected table, and I would be very glad if you would publish this list in some future issue of the *Journal*.

CHARLES F. WILLIS,
Consulting Supervisor, Phelps Dodge Corporation.

Bisbee, Ariz., May 22, 1919.

May 22, 1919.

U. S. Department of Labor,
Bureau of Labor Statistics,
Washington, D. C.

Gentlemen:

I have noted in your "Monthly Labor Review" for April, 1919, an article on the wages and labor conditions in gold mining. In that article you have a table entitled "Rates of wages per day in certain branches of metal mining where gold is a product or a byproduct." This table contains quotations of wages of the Phelps Dodge Corporation at Bisbee, and of the twelve rates quoted eight are incorrect. The following are the corrections:

		Quoted Rate	Correct Rate
September, 1913	Machine men	$4.00	$4.00
	Muckers	3.75	3.75
September, 1914	Machine men	4.00	3.60
	Muckers	3.75	3.35
September, 1915	Machine men	4.10	4.10
	Muckers	3.85	3.85
September, 1916	Machine men	5.32	5.35
	Muckers	5.07	5.10
September, 1917	Machine men	5.60	5.35
	Muckers	5.35	5.10
September, 1918	Machine men	5.50	6.10
	Muckers	5.25	5.85

We do not object in the least to having rates of wages published, but we desire that they should be correct. Your table, published as it is by the U. S. Department of Labor, might be considered authoritative and be the source of many quotations in the future which would be in error. We should greatly appreciate a correction being made in a future issue of the "Review."

Also, we should be glad to know where you obtained the figures quoted.

(Signed) CHARLES F. WILLIS,
Consulting Supervisor,
Department Industrial Relations, Phelps Dodge Corporation

Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

War-Minerals Relief Commission

Just prior to the closing of the docket of the War-Minerals Relief Commission to further claims, an avalanche of applications for relief was received. The records are far from complete. Before departure of the commission to hold hearings at various cities, all claims will have been listed and precise information will be made available as to the total amount of the claims and as to how the claims are divided among the different minerals and the several states. The larger claims docketed since compilation of the list published in last week's issue have been filed by the following: Aguilera & Co., Santiago, Cuba; Georgia Iron and Coal Co., Atlanta; M. E. Johnson, Muskogee, Okla.; N. A. Adler, Batesville, Ark.; C. J. Shank, Hazel Creek, Calif.; Georgia Copper Co., Lincolnton, Ga.; Red Mountain Chrome Mining Co., Eureka, Calif.; Kirchman & Crawford, Silver City, N. M.; Chatham & Britten, Seattle; Kendall, Jackson, Johnson & Wise, Sapulpa, Okla.; Dubakella Mining Co., Berkeley, Calif.; L. R. Payne & Co., Fresno, Calif.; Pocahontas Manganese Corporation, Bluefield, W. Va.; A. D. Brinkerhoff, Dallas, Tex.; Holmquist & Johnson, Denver; Maydew Mining Co., Green River, Utah; R. S. Handford, Batesville, Ark.; James A. Ross, Pleasant Grove, Calif.; W. W. Dailey, Wickes, Mont.; E. E. Hoeft, Nevada City, Nev.; United Tungsten-Copper Mines, Los Angeles; W. A. Ewing, Medford, Ore.; Parker & Shetter, Nogales, Ariz.; James E. Higgins, Butte; Edward A. Silberstein, Duluth; J. H. Heron, Denver; Cypress Chrome Co., Anacortes, Wash.; Manganese Metal Co., Tacoma, Wash.; Elanore Manganese Co., Roanoke, Va.; Hillside Mine, San Francisco; Ralph W. Goodhue, Indian Falls, Calif.; and the estate of Harvey W. Cowan, Chicago.

Potash and Magnesite Embargoes Are Removed

The War Trade Board has announced, according to report of the American Mining Congress, that it has no further power to extend the licensing control over potash or magnesite. Large shipments of potash are due from Alsace this week. Dyestuffs are still under control of the War Trade Board and will so remain until peace is signed. Magnesite, which before the war was furnished to the United States exclusively by Austria, can now be imported into the United States, in the face of the fact that Austria is still an enemy country. The Shipping Board authorizes a freight rate for magnesite in ballast from Austrian ports at $7.50 per ton.

A request has been made by the Congressional delegation from the State of Washington to the War Trade Board for replacing the embargo on magnesite. This request has been refused. It is said that a large quantity of Austrian magnesite is ready for shipment to this country. The development of magnesite in Washington and California to meet the war demand created a heavy investment in this industry. The American Mining Congress is asked to assist in securing the passage of legislation which, through embargo or tariff, will prevent the destruction of the American magnesite industry, which seems certain, if Austria is allowed to ship under the above rulings.

Pan-American Conference Program

A large number of business and technical men particularly interested in Latin America attended the second Pan-American Commercial Conference, held at Washington, June 2-6, and the mining industry was well represented. The program in general was as follows:

I. GENERAL REVIEW OF PAN-AMERICAN EXPORT AND IMPORT SITUATION

II. TRADING METHODS FOR BOTH EXPORTS AND IMPORTS
(a) Business ethics.
(b) Merchandising.
(c) Commission service and direct trade.
(d) Export and import combinations.

III. SHIPPING AND OTHER TRANSPORTATION
(a) Steamship lines and ships.
(b) Other transportation, including aeroplanes as an aid to commerce.

IV. FINANCING TRADE, INVESTMENTS, LOANS
(a) Banking.
(b) Credits.
(c) Investments, loans.
(d) Government aid to commerce, including the War Finance Corporation.

V. ENGINEERING AIDS TO COMMERCE
(a) Railways and highways.
(b) Waterways and harbors.
(c) Irrigation.
(d) Sanitation.

VI. PARCEL-POST AND TRADE REGULATIONS
(a) Parcel post.
(b) Patents and trademarks.
(c) Consular and other trade regulations.
(d) Packing and insurance.

VII. COMMERCIAL INTELLIGENCE
(a) Advertising and publicity.
(b) Newspapers and periodicals.

VIII. EDUCATIONAL AND SOCIAL AUXILIARIES TO COMMERCE
(a) Vocational training.
(b) Language study.
(c) Exchange of students and professors.
(d) General influences.

Committees on Mines and Mining

The committees on Mines and Mining of the Senate and House, respectively, as finally constituted, are as follows:

Senate: Miles Poindexter, Washington, chairman; Thomas Sterling, South Dakota; Howard Sutherland, West Virginia; Medill McCormick, Illinois; Lawrence C. Phipps, Colorado; Truman H. Newberry, Michigan; Charles B. Henderson, Nevada; Thomas J. Walsh, Montana; Henry F. Ashurst, Arizona; James D. Phelan, California.

House: Mahlon M. Garland, Pennsylvania, chairman; Moses P. Kinkaid, Nebraska; Marion E. Rhodes, Missouri; J. G. Monahan, Wisconsin; L. B. Echols, West Virginia; J. M. Robison, Kentucky; Edwin B. Brooks, Illinois; William J. Burke, Pennsylvania; Oscar R. Luhring, Indiana; Otis Wingo, Arkansas; Milton H. Welling, Utah; Peter J. Dooling, New York; Lucien W. Parish, Texas; E. B. Howard, Oklahoma.

Imports of Potash To Be Retarded

Though little is being said about it, every legitimate effort that can be made by Government agencies is being put forward to retard the importation of potash until Congress can have a chance to take action. In the meantime, members of Congress friendly to the domestic potash industry have taken the Henderson bill of the last session as a basis and are attempting to work out a measure which will have the greatest possible chance of passage.

It is the understanding among officials at Washington that the President, who was anxious that the exchange of potash for food shall begin at the earliest possible moment, is now willing that Congress be given a reasonable opportunity to take action in the matter, before steps are taken to stimulate the importation of potash.

Tariff on Zinc

The following bill presented by Congressman Mc Pherson, of Missouri, has been referred to the Committee on Ways and Means (H. R. 1246):

"A bill to provide a tariff and obtain revenue in connection with the metal contents of zinc ore.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that on and after the day following the passage of this act there shall be levied, collected, and paid upon the metallic contents of all zinc ores imported from any foreign country into the United States or any of its possessions a tariff of 2c. per pound."

Exposition at Washington

Wide attention has been attracted to the exposition being conducted by the Interior Department. The extensive lobby of the new Interior building is being used for the exposition. If the present rate of attendance continues, it is believed that no less than 100,000 persons will have visited the exhibit.

Minerals and the industries, in their production and preparation, occupy an important portion of the exhibit space. The war minerals are featured, as it has been on them that important portions of the department's work has centered during the last three years. The petroleum industry also is given prominence in the exposition. Large models of drilling rigs are on display and every step in the refining of petroleum is shown graphically. Oil shale is the basis of an important exhibit, which includes the field equipment for testing oil shales.

The Geological Survey sums up on large charts some of the most striking features of its work. Among other things, it is shown that more than 8500 letters are exchanged each month with the producers of minerals. The Survey's distribution of maps during the last year has exceeded 600,000, of which 450,000 were sold.

Extensive landscapes in relief show characteristic surface plants at metal and coal mines, at oil wells, and at stone quarries. In the same landscape are shown prospecting operations and stream gaging; and topographers and geologists at work.

One of the most striking features of the Bureau of Mines' exhibit is the display of all stages in the handling of metals and other minerals, from the crude raw material to the finished product. Copper, nickel, tin, lead, antimony, zinc, potash, sulphur, mica, abrasives, and other minerals are thus shown.

Gas masks, oxygen-breathing apparatus, dust and fume respirators, as well as a complete collection of the absorbents used in protection against gases, are on display. The explosives exhibit is one of the most complete ever shown, as is the display of types of mine safety lamps. A section of the Bureau of Mines exhibit shows how coal analyses are made and how fuel inspection is conducted.

Tin-Ore Importations

On May 28, the War Trade Board announced that applications would be considered for licenses to import tin ores and tin concentrates subject to the following conditions:

1. That such licenses will permit the importation only of shipments made from points of origin on or after June 8, 1919; and
2. That such import licenses will not be valid for entry until July 1, 1919.

Alaskan Mineral Statistics

A complete statistical compilation on Alaskan minerals will be made in connection with the taking of the census. The distribution of the questionnaires will be begun in July by the mineral-resources division of the U. S. Geological Survey. Arrangements have been made for the census enumerators to look up those who are delinquent in replying to the questionnaire. W. F. Lopp, superintendent of education in Alaska, will be in charge of the enumeration of population in Alaska and is perfecting arrangements which will insure the most complete returns possible on the status of the mineral industry of Alaska.

Tariff on Tungsten

The following bill by Congressman Charles B. Timberlake, of Colorado, according to the report of the American Mining Congress, has been referred to the Committee on Ways and Means (H. R. 2949):

"A bill to provide revenue for the Government and to promote the production of tungsten ores and manufactures thereof in the United States.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that on and after the day following the passage of this act there shall be levied, collected, and paid upon the articles named herein when imported from any foreign country into the United States or into any of its possessions, except the Philippine Islands and the island of Guam and Tutuila, the rates of duties which are herein prescribed, namely:

"First—Crude tungsten, ores and concentrates, $10 per unit of tungsten trioxid therein contained, a unit being herein defined at 1% of tungstic acid in a short ton of 2000 pounds.

"Second—Ferrotungsten, powder, tungstic acid, calcium, tungsten steel salts, and compounds of tungsten, and all other manufactured materials containing tungsten, not especially provided for in this section, $1.25 per lb. of tungsten contained therein.

"Sec. 2. That so much of any heretofore existing law or parts of law as may be inconsistent with this act is hereby repealed."

May Mining Dividends

Dividends paid in May, 1919, by 16 United States mining and metallurgical companies making public returns, amounted to $5,616,244, as compared with $10,543,897 paid by 22 companies in May, 1918.

Canadian and Mexican companies paid $749,340 in May, 1919, compared with $1,534,963 in the corresponding month of last year.

Greene Cananea did not pay the dividend which would have been due at this time, and the following companies made reductions in their payments: Anaconda (from $1.50 to $1 per share), Chief Consolidated (from 12½c. to 6½c.), Miami (from $1 to 50c.), Mohawk (from $2 to $1), United Verde Extension (from 75c. to 50c.), Granby Consolidated (from $2.50 to $1.25).

United States Mining and Metallurgical Companies	Situation	Per Share	Total
Am. Zinc, Lead & Sm., pfd	U. S.	$1.50	$120,810
Anaconda, c.s.s.	Mont.	1.00	2,331,250
Barnes King, c.g.	Mont.	.10	40,000
Caledonia, l.s.	Ida.	.01	26,050
Chief Cons., l.s.	Utah	.06½	57,475
Cresson Cons., g.	Colo.	.10	122,000
Golden Cycle, g.	Colo.	.03	45,000
Homestake, g.	S. D.	.50	125,580
Internat. Nickel, pfd.	U. S.-Can.	1.50	133,689
Miami, c.	Ariz.	.50	373,557
Mohawk, c.	Mich.	1.00	100,000
Nevada Wonder, s.g.	Nev.	.05	70,423
New Jersey Zinc	U. S.	4.00	1,400,000
Reorg. Booth, g.s.	Nev.	.05	50,000
United Eastern, g.	Ariz.	.07	95,410
United Verde Exc.	Ariz.	.50	525,000
Canadian and Mexican Companies	**Situation**	**Per Share**	**Total**
Amparo, g.s.	Mex.	.04	80,000
Coniagas, s.	Ont.	.12½	100,000
Granby Cons., c.	B. C.	1.25	187,500
Hollinger, s.g.	Ont.	.05	246,000
Lake Shore, s.	Ont.	.02½	50,000
Lucky-Tiger Comb., g.	Mex.	.12	85,840

Reorganized Booth paid 5c. a share, its first dividend since 1916, and, in addition, distributed one share of Tonopah Divide stock for each 50 shares of Booth stock.

The totals for the first five months are as follows, the figures for the corresponding period of last year being given in parentheses: United States mining and metallurgical companies, $40,076,176 ($65,100,172); holding companies, $696,572 ($743,433); Canadian, Mexican, Central and South American companies, $6,613,091 ($7,066,244).

Chicago Meeting of the A. I. M. M. E.

Plans for the meeting of the American Institute of Mining and Metallurgical Engineers at Chicago next September are assuming definite form, and the committee in charge announces the following schedule of events:

On Monday, Sept. 22, the opening day, the morning will be devoted to registration of members and guests at the convention headquarters, the Congress Hotel. Monday afternoon the first session for presentation and discussion of technical papers will be held, and in the evening a smoker, at which the committee guarantees all traces of glaciation will be dissipated.

It is planned on Tuesday to make an excursion in a body, by a boat chartered for the occasion, across the south end of the lake to Gary, for a trip through the famous steel mills. Wednesday will be devoted to technical sessions, morning and afternoon, and in the evening the banquet will be held at the Congress Hotel, at which all members of the institute and their wives will be the guests of Chicago.

On Thursday, a special train will convey the members and guests to La Salle and Depue, Ill., where the zinc smelteries, coal mines, and cement works will be visited. For those to whom these industrial operations are not of particular interest—this may include many of the ladies—there will be a trip by automobile to Starved Rock and other points of historical interest in the vicinity of La Salle.

For Friday, the 26th, several optional excursions have been planned to local industrial plants. One trip will take in the lead refineries at East Chicago and the Standard Oil Refinery at Whiting. Another excursion will be to Milwaukee, to the plants of the Allis-Chalmers Co. and the Power and Mining Machinery Co. This trip will also include the metallurgical works at North Chicago of the Fansteel Products Co. where the company's novel electrothermal processes in the production of metallic tungsten, molybdenum, cerium, and tantalum will be demonstrated.

For those interested in coal mining it is planned to have an excursion to the fields in Franklin and McCoupin counties, leaving Chicago late Friday evening and spending Saturday at the mines.

Caldwell Bill Reintroduced

The Caldwell bill, which aims to provide for further educational facilities by requiring the War Department to loan certain machine tools and scientific instruments, not in use for Government purposes, to trade and technical schools and universities, and for other purposes, was reintroduced in the House on May 26 and has been referred to the Committee on Military Affairs. The bill provides further that each institution so equipped shall be responsible to the Government, under regulations to be prescribed by the Secretary of War, for the proper care and safe return of such equipment when demanded, ordinary wear and tear excepted.

British Pig-Iron Output in 1918*

The British pig-iron output in 1918, according to the statistical bureau of the National Federation of Iron and Steel Manufacturers, was 9,939,429 gross tons, as contrasted with 9,420,254 tons in 1917. The following table gives the production by grades in 1916, 1917, and 1918:

BRITISH PIG-IRON PRODUCTION BY GRADES

	1918	1917	1916
Forge	772,321	864,899	899,467
Foundry	1,296,394	1,162,982	1,418,824
Basic	3,166,556	3,082,562	2,290,549
Hematite	3,538,435	3,993,374	4,042,014
Spiegeleisen, ferromanganese and ferrosilicon	246,943(a)	296,524	291,845
Direct iron castings	18,780	20,053	105,284
Totals	9,039,429	9,420,254	9,047,983

(a) Includes 23,078 tons of ferrosilicon.

The Cleveland district is credited with 2,424,139 tons of the 1918 total, most of it basic iron; the Scotland district made 1,062,645 tons, mostly hematite iron.

Lake Superior Safety Conference

The first general safety conference of mining interests in the Lake Superior districts is to be held at Duluth, Minn., June 19 and 20, according to an announcement by B. O. Pickard, mining engineer in charge of the Lake Superior district for the Bureau of Mines. The meeting will be held under the auspices of the Bu-

*From *Iron Age*, May 1, 1919.

reau. It is expected that the conference will be attended by mine managers, superintendents, and safety engineers of all the metal mines of Upper Michigan, Wisconsin, and Minnesota.

In this connection, Mr. Pickard announces that the State Industrial Commission of Wisconsin has agreed to coöperate on mine inspection with the Bureau of Mines. The Bureau is asked to name a state mine inspector and two assistants, and the Industrial Commission will divide the expense with the Bureau.

The results of mine inspection in Michigan and Minnesota, in the saving of lives and limbs through the enforcement of safety regulations, have convinced the Wisconsin commission that such inspection is desirable for the protection of workers in Wisconsin zinc and iron mines and quarries.

John Hays Hammond for High Wages

John Hays Hammond has authorized the Department of Labor to circulate the following statement of his views with regard to the wage situation and its bearing on industrial and social conditions:

"The immediate problem that confronts us is the resumption of business, including, particularly, building construction, manufacturing, and mining. Business is being retarded because we are hoping for—or fearing—lower prices. Whether these fears, or hopes, are to be realized, no one can, perhaps, adduce convincing argument, but above the mass of conflicting contentions that are being applied to the situation one fact stands out preëminently: we can return neither to pre-war conditions nor to pre-war prices.

"As regards the future wage scale: I am of the opinion that we should not expect any significant reduction; nor should we desire such a reduction. We should not expect a lower wage scale, because there can be but little doubt that America faces a new era in her national development; that the future holds immeasurable potentialities; that at no time in the life of the nation has the outlook been brighter.

"Nor, as I have said, should we desire a general reduction of wages; as high wages bring with them greater purchasing power and higher standards of living among the wage earners of the nation. The economic importance of the increased purchasing power of our industrial wage earners is evident when we recognize the fact that this class numbers about eight million, and with those directly dependent upon them more than thirty million, or nearly one-third of the entire population of our country.

"From a social and political point of view, high wages are of inestimable advantage, in that they make possible a higher standard of living, which assures social contentment, industrial peace, and higher standards of citizenship.

"To maintain a high wage scale, wise and scientific tariff legislation is indispensable, in order to protect our national industries from the dumpings of the products of cheap foreign labor upon our home market.

"But when it comes to the development of an export trade, where we are to meet the competition of underpaid labor, we must rely upon the superior efficiency of our wage earners, and success can be attained only by the earnest coöperation of wage earners and employers, to increase in every way possible the productivity of our national industries."

Butte & Superior Decision

By R. C. Canby*

The Supreme Court of the United States handed down a decision on Monday, June 2, in the Minerals Separation, Ltd., vs. Butte & Superior Mining Co. case. At that time the court announced that owing to the technical nature of the case the opinion would not be read. The court merely announced its conclusion and decision.

From this announcement it would seem that the court had decided that the use of oil in any fraction of 1% on the ore constituted an infringement when said use is in conjunction with the disclosed purpose of the patent. This is in accordance with the contention of Minerals Separation. The court has apparently held, however, that the agent of the patent is any oil or oily substance which has the characteristic of preferential affinity for metalliferous mineral over gangue. On this point the court seems to have upheld the contention of Butte & Superior. The decision, as a whole, would seem to favor the Minerals Separation, Ltd., in so far as the Butte & Superior Co. will have to account for the use of the process during the last three years.

Whether the decision will develop to be entirely satisfactory to Minerals Separation will not definitely appear until the opinion of the court has been obtained and carefully studied. The synopsis given out at this date hints at a restriction of the process to the means disclosed in the patent. If this is so, it will have an important bearing on the question as to whether the pneumatic process is within the disclosed means.

The District Court in the Butte & Superior case, which has just been reviewed by the Supreme Court, introduced the question as to effectiveness of the oil used as well as to quantity, deciding that the petroleum oils used by the defendant were inert and useless and therefore not to be counted as the oil of the patent in determining quantity used, but stated that if the oil was efficient any oil in excess of 1% would be of that abandoned to the public.

The Circuit Court of Appeals reversed the District Court and held that the oils used by the defendant were effective, and that the use of such oils in quantities in excess of 0.5% was not within the patent. It is clear that the Supreme Court has reversed the Circuit Court of Appeals in so far as the Circuit Court of Appeals had held that the use of oil in quantities between 0.5 and 1% were not infringing, but has sustained that court as to its holding where the use of oil exceeds 1%. It would seem that the Supreme Court has further upheld the Circuit Court of Appeals upon the question of the character of the agent used, for it has refused to find, as requested by Minerals Separation, that the character of the oil is critical to the ore.

From our Washington correspondent we received the following telegram relative to the decision:

What is regarded as a further victory for Minerals Separation, Ltd., came June 2 in the opinion of the United States Supreme Court in the case of Minerals Separation, Ltd., vs. the Butte & Superior Mining Co.

It is believed in legal circles in Washington that the validity of the patent has been established for all time. Minerals Separation enjoyed further advantage in having the scope of the patent broadened to cover any use of oils up to any fraction of 1% of the weight of the ore. On the other hand, the court held that the process employed by the Butte & Superior Co. which made use of oils in excess of 1% did not constitute an infringement.

*Consulting metallurgist, Wallingford, Conn.

Editorials

National Economy

TO ASCRIBE to the Government an almost limitless power to spend is an all too prevalent habit. Few outside of those who pay Federal and State taxes keep in mind the pertinent fact that what the Government spends it must also collect from its citizens. When John Smith buys goods and the bills are presented he naturally expects to pay for them, and he knows that, if he does not, a collector will come after the money due, or through process of law a persistent attempt will be made to enforce payment.

Individually the bills of the nation are not presented to all of the Smiths, and the Joneses, and the Browns and others who make up our citizenry. The Government acts as our agent, and in that capacity determines what it shall buy for us, makes payment for us, and then turns around to us and collects from us the money with which to make payments. As an agent, the Government, or, rather, its employees, must be paid for their services. What the taxpayer gets from this agent is therefor what he has paid to the Government less what it has cost to maintain the agency. As with any other agency, the greater the amount of business, the greater the sum which is spent for the maintenance of the agency and as payments for its employees' services.

During the war we were importuned to exercise thrift and to economize to the limit. Most of us in one way or another did so. Some of us undoubtedly experienced a questioning way back in our minds as to whether the thrift lectures might well have been turned upon the Government itself, but during the course of the war little direct criticism was made. There was a general feeling that nothing should be permitted to interfere with the speedy termination of the war in a satisfactory manner. We acquired the habit of accepting the judgment of the Government in determining the purpose for which the money of the taxpayer should be spent, and the amount as well. Of course, we expected that the men whom we sent to Congress would keep in their minds the fact that they were spending our money as well as some of their own, and that they would use due caution in keeping expenses down.

Curiously enough, there does not seem to be any other effort now than the invention of new methods of spending not less but more money. It is an opportune time for the public to turn to and give a few thrift lectures to Congress itself. In fact, if thrift lectures make any impression at all, it might be well worth while to provide a lot of them for Congress.

We also believe that a thorough course of thrift lectures should be given in every governmental department. We believe in the budget system, and as a part of that system the strict limitation of each governmental department to a definite number of activities. Departments have a way of spreading out and still further spreading out. We seriously question the necessity of this expansion, although not in all instances, for account must be taken of the growth of the country.

Senator Smoot has sounded a warning note that the Government's expenditures are far outrunning its income. He declared that a beginning toward economy must be made somewhere. Pointing out that the expenditures during the next year will amount to twelve billion dollars, of which only four to five billion can be raised by taxation, he said: "With such a situation confronting this country it would be suicidal for the Government to continue to spend money as it has been during the last two years. Congress must reduce appropriations all along the line." The Senator further expressed the view that his colleagues were fully aware of the situation and would coöperate with him and other members of the House and Senate who are trying to economize.

This is a hopeful sign. We must, however, get behind the members of Congress who feel their trusteeship sufficiently to take effective steps to reduce our expenditures. It is necessary for the practice of Government economy to spread to the state legislatures, and on further to the municipal governments.

Thrift on the part of all of our officials in governmental expenditures should become the prevailing custom.

Happenings in Mexico

WHEN school teachers strike and soldiers have to be ordered out to quell an unruly mob of teachers striking for pay long withheld, the event may well be considered the last straw in a long series of happenings any one of which might seriously disturb a much better-balanced nation than Mexico. The latest dispatches from that unhappy country state that Carranza has placed the city of Mexico under martial law. There is said to be a bitter feeling toward the military caste, and strikes and uprisings, according to latest accounts, are taking place.

The United States Department of State, in response to a request to permit over 2000 Mexican troops from Agua Prieta to pass through New Mexico, Arizona, and Texas into Juarez, has refused permission, on the ground that the presence of Carranza troops was necessary in Agua Prieta for the protection of American citizens against operations of Yaqui indians in that vicinity. Late accounts foretell greater activity on the part of Villa and contain the announcement that General Felipe Angeles, Villa's principal military leader, has been declared provisional president under the Mexican constitution of 1857, with Villa as Angeles' Secretary of War.

Though there is a dearth of accurate news of what is taking place in Mexico, sufficient information dribbles through to warrant the belief that the optimistic predictions of a short time ago are not soon to be fulfilled, or at best their fulfillment is to be postponed to some time in the distant future.

The fires of revolution have flamed forth at various times, and for a while it looked as if they had been

quenched, but the conflagration has apparently broken forth again. How far it will go, and how serious will be its consequences, no one can tell. We hold no brief for Carranza, but we had hoped that he would develop sufficient strength to bring order out of the confusion left in the wake of the constantly recurring revolutions.

If the present situation in Mexico is going to grow worse, and the little progress toward better things which has taken place in the past year is to be lost, what is to be the attitude of the Administration toward Mexico? American mining interests and the rights of American citizens are involved. How are they going to be protected?

Industrial Insurance

IT AFFORDS us pleasure to be able to present a mining engineer's review of State Industrial Insurance in Nevada. The problem of handling personal injuries incurred in mining and other industries in an equitable manner has long been a source of annoyance and difficulty between employer and employee. That the whole subject is on its way to a rational settlement no one who has kept in touch with legislative events in the past five years can deny.

When industrial insurance was undertaken in Nevada, few had much hope that real improvement would result, but many mining companies were glad to make the experiment. The results have been excellent, and industrial insurance has now been accepted generally as the solution of the problem. Its success depends largely upon the men in whose hands the administration is placed. With due care in the selection of such men, as has evidently been the practice in the instance mentioned, an excellent result is assured.

Federal Aid for Prospectors

THE suggestion made by E. J. Ristedt in an article in this issue is at least worth discussing by mining engineers, the Bureau of Mines, and the U. S. Geological Survey. That the plan outlined will not find great support is our candid opinion, although we will be glad to hear from others upon the subject.

It occurs to us that a way can be found that will avoid the proposed governmental assistance and at the same time stimulate prospecting work. The familiar method of the "grub stake" and the prospector starting out with pick, shovel, and the hope of finding a rich deposit can undoubtedly be improved upon. Formerly, the discovery of a deposit was effected with comparative ease, as in many instances the oreshoot outcropped or gave pronounced evidences of its presence upon the surface. It is the prevailing opinion that most of the easily found deposits have been discovered, although there are undoubtedly some that still await the coming of the casual prospector.

Two things suggest themselves to us. One is to improve the ability of the prospector by selection and intensive training along the lines of the mining geologist, due regard being paid to the differences of point of view between the mining geologist and the prospector-geologist. The other is to put the prospector-geologist on a salary, just as a properly qualified engineer is so placed by a mining company.

To give a man his "grub" and the hope of a share in what he may discover might have been well enough in the day when discoveries were easily made, but this form of assistance is not sufficient to make the avocation worth while for a man who has the keenness to fit himself thoroughly for the task of searching out mineral deposits upon the subtle evidences that may now be discoverable.

Exploration companies have usually been such in name alone. Most of their work has consisted in the examination of discoveries already made, and in some cases they have continued the work started by the discoverer. An enlargement upon the field of these companies is much to be desired, and if they take the initiative by placing in the field well-trained men under remunerative salaries for the purpose of making discoveries they will, we venture to predict, be more successful than they have been in the past.

There are probably many young mining engineers who have excellent groundwork for the business of prospector-geologist and who would be glad of the chance to work along the lines suggested. Conservatism is an excellent thing, but often unexpected rewards come to the individuals or company that starts a new method of attacking an old problem.

The Townsend bill creating a Federal Highways Commission, consisting of five members, has for its object the coördinating of the highway construction and the highways of the individual states as parts of an integral system. It also provides that roads should be built on the basis of the present requirements, plus what might be reasonably expected of them in the future. To secure suitable construction and a proper conservation of the large sums that are being spent and will be spent in the near future is a worthy and commendable objective.

The situation of the railroads is rapidly reaching a climax. Walker D. Hines, Director-General of Railroads, on May 24 asked Congress to appropriate $1,200,000,000 in addition to the $500,000,000 already provided to meet deficits and to continue Government operation of the American railroads. Fewer trains, poorer service, and higher costs to both passenger and freight shipper, as well as an aggregate loss of $486,000,000 to the Government up to Apr. 30, 1919, in a few words represent what the experiment in Government operation has cost the country.

There was a time when the farmer paid little attention to his tools and when farm tools were made to last only a season. The increasing use of machinery in farming has put both manufacturer and farmer on the *qui vive* to get the most out of the mechanical equipment, the former to turn out a machine that would stand up to the work and the latter to care for it in such a way as to prolong its useful life and retain its efficiency. The miner has passed through a similar development. More and more mechanical equipment is being used in mining. More and more does mechanical upkeep determine the success of such equipment. In this issue Harry E. Scott emphasizes the importance of keeping air drills in first-class mechanical condition and the intelligent handling and conservation of repair parts. Undoubtedly many mines do pay particular attention to the mechanical efficiency of air drills and are equipped to make shop tests, but others give little at-

tention to this vital matter. Sharp steel, good mechanical condition of the drill, and properly trained miners are three elements which contribute a not unimportant part in reducing mining costs, and which often determine the difference between a property which pays and one which is a burden to its stockholders.

BY THE WAY

We quote, from the *Sunday Mining Gazette* of Houghton and Calumet, Mich., the following, which may throw some light on the criticism to which the *Journal* has been subjected regarding the failure of our issues to reach their destination within scheduled time: "Here is one of any number of instances that cry out loud as part of the conspiracy to 'get' Mr. Burleson, the Postmaster General: George L. Walker's Boston *Commercial*, published a week ago yesterday, Apr. 19, reached the *Gazette* office through the mail, Saturday, Apr. 26. This is the third time within two months that we have observed similar delinquent treatment of this one newspaper. The *Engineering and Mining Journal*, issued 10 days ago, due to arrive in Houghton a week ago, reached here on Friday."

"My missus do feel pert these days, m'son," said Cap'n Dick. "An' can't say as 'ow I blames 'er, for, dam-me, tha women, bless their 'earts, 'ave done theyselves proud in h'all this 'ere war work. 'Ere they be 'oldin' man's jobs in tha factories, some o' they 'as gone in for politics an' h'even for 'igh finance. Firs' bloody time I 'eard tell o' they in finance wuz in h'Australia w'en Jan Tregar's missus bought shares in Royal Blue mine an' cleaned h'up a fortun'. Jan, 'e wus tribbitin' on eight-'underd level o' tha Royal, an' 'e nawed bloody well they wuz very like to 'it tha reef h'any day. 'E nawed, too, tha super wuz a 'ooken-snivey rascal, an' if 'e got firs' chance 'e'd give none to tha res'. So Jan an' 'is missus fixed a'tween them as to 'ow she wuz to naw w'en they'd struck tha h'ore. H'every day she'd meet Jan w'en come h'off shif', an' they'd walk 'ome together. But one day Jan didn't come on time, an' then tha missus nawed sumthin' wuz h'up; so she waited. Truth to tell, they'd 'it tha h'ore, but super sent word for tha men to work 'nother 'alf shif' so 'e an' tha directors could corner tha market a'fore tha news got raoun'. 'Baout that time, h'up come tha skip with a bit o' timber on un, one h'end h'all marked with candle soot. An' then Jan's missus nawed. So she flew to tha broker's an' put h'up tha savin's she an' Jan 'ad. 'Ow do I know baout this 'ere? Well, m'son, I 'appened to be at station gettin' bit o' fresh drill steel w'en Jan 'elped put they bit o' timber on tha skip. Super wuz there too, and' 'e sez, ' 'Ere, boys; let's tell 'em to send daown more timber to keep things gawin'.' An', min' you, 'e did, too—for Jan an' 'is missus."

D. E. A. C.

As an example of the perils that beset the path of the neophyte whose mind and pocketbook are astir to the tremendous possibilities of investment in the great unknown, we publish (verbatim) the following "Geological Observation," appearing in an advertisement which is taken from a Southwest newspaper: "A portion of the land examined by me I found to be a great land made within the last 1000 years. I found it to be pre-cambrian formation and overlaid with strand sand 25 ft. and next to the cambrian zone, is the carboniferous zone. I refer to the carboniferous formation for the jures toras age. After the water has pierced, sand has in this section overlaid the blue lime which belongs to the devonian formation, and is undoubtedly of animal age. There is intrusion that shows some oil on surface which can be found in the clay, the sun bringing out a greasy substance, which occurs only from 1 to 3 mm. in thickness. This indicates that oil must be here, or anyhow, not far. Therefore, it ought to be carefully prospected for oil and gas. The dolomite lime, or common named magnesium lime, a thickness of which is from 120 ft., overlying the devonian lime, a blue and brown shale which resembles lignitem, can be seen. All lime and sedimentary rock inspected has wonderful fossiteles and in this section, however, a broad, great thickness of oysters, which have lived on reefs in this inland sea, and in the calcium formation imbedded, and brought impression of petrification, which indicates a thickness of between 30 and 40 ft., as found in a well drilled up to 550 ft. Semi-anticline appears at a depth of 500 ft. There the carboniferous zone is overfaulted by the pre-cambrian in this section and slopes N. E. There is no need for anyone to hesitate to drill in this section near the arenas (half circles); as oil runs off from the anticline, gently sloping towards the arenas (half circles); therefore, a pool of oil is formed next to the sinaline along and in the arenas (half circles); and later building a contact wall with the anticline making one of the best trend and oil pools below the blue lime. And there oil is to be found in paying quantities. There has never been any volcanic action within 20 miles square. Everything is in its origin. Lime extends for a short distance, but I will not say, as it might be covered by strand sand, and further exploring will assure. Thence shale, thence silica, thence lime, thence black shale, thence blue shale with a little stray sand; thence blue lime and then a brown shale, very thick, 100 ft. I will refer to about 2700 ft. shall be drilled, and would not miss very many feet if I would say at 2500 ft., and will strike oil in large quantities. Geological observations have proved to me that the pressure brought on a rolling knoll in the eastern direction, forming (half-circles) and saddles, there oil has accumulated through great water sheets, leaving a deposit in the arenas which passed the dyke. This part should be carefully inspected, because a few blossoms of lead can be found close to the dyke. There is no need to prospect west about 20 miles from here, as there was volcanic disturbance and the dykes are broken and brought the mineral to the surface. This action occurred lately, within the last 1000 years, from time to time, and the last disturbance, I would say, was in the last 50 years, which indicates distinctly on the surface and may be remembered by old settlers in the vicinity at that time, and the oil disappeared. Therefore, I will say that all the oil which was brought down by the rivers is only on the east side of the river in paying quantities, as there was no disturbance, and any volcanic action on the east side, and everything slopes S. E., partly sinking towards the east of Columbus, there is the strongest showing. I recommend this to interest people and bring the greatest wealth to the surface. ——— ———,

——— Hotel."

The Mining Index

This index is a convenient reference to the current literature of mining and metallurgy published in all of the important periodicals of the world. We will furnish a copy of any article (if in print) in the original language for the price quoted. Where no price is quoted the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for the foreign papers. Remittance must be sent with order. Coupons are furnished at the following prices: 20c. each, six for $1, 33 for $5, and 100 for $15. When remittances are made in even dollars, we will return the excess over an order in coupons, if so requested.

COPPER

101896—ALLOYS—The Properties of Some Copper Alloys. W. Rosenhain and D. Hanson. (Advance Copy, Inst. of Metals, Mar. 25, 1919; 12 pp., illus.)

101897—ARIZONA—Gold, Silver, Copper, Lead and Zinc in Arizona in 1917. V. C. Heikes. (Mineral Resources of the U. S., 1917—Part I; 42 pp.)

101898—IRISH COPPER-ORE DEPOSITS. (Statist, Apr. 19, 1919; 1½ pp.) 40c.

101899—LEACHING—Practical Considerations in Ammonia Leaching of Copper-Bearing Ores. Lawrence Eddy. (Chem. and Met. Eng., Apr. 1, 1919; 5¼ pp.) Description of Kennecott Copper Corporation plant and its operation.

101900—MILL—Unloading, Crushing, and Screening at the Arthur Mill of the Utah Copper Co. F. G. Janney. (Min. and Sci. Press, Apr. 5, 1919; 7¾ pp., illus.) 20c.

101901—REFINING—Ampere Efficiency in Copper Refining. M. H. Merriss. (Eng. and Min. Journ., Apr. 26, 1919; 1½ pp.) 20c.

101902—REFINING—Laboratory Electro-Deposition Plant. Carle R. Hayward. (Chem. and Met. Eng., Mar. 1, 1919; ¾ p.) Describes a set of tanks with glass sides used at Mass. Inst. of Technology.

GOLD AND SILVER—GEOLOGY

101903—MANITOBA—Prospecting Areas in Manitoba. E. L. Bruce. (From a pamphlet entitled, Manitoba's Northland, published Nov., 1918; 10 pp., illus.)

101904—ONTARIO—Larder Lake Gold Area. Percy Hopkins. (Can. Min. Journ., Feb. 5, 1919; 3½ pp., illus.) 20c.

101905—ONTARIO—Slate Islands, Lake Superior. Arthur L. Parson. (Ann. Report Ont. Bureau of Mines, 1918; 12½ pp., illus.)

101906—SULPHIDE ORE—Occurrence of Gold in Sulphide Ore. Walter S. Palmer. (Eng. and Min. Journ., May 24, 1919; 1 p.) 20c.

GOLD DREDGING

101907—CALIFORNIA—Latest Yuba All-Steel Placer Dredge. Lewis H. Eddy. (Eng. and Min. Journ., Apr. 26, 1919; 1 p., illus.) 20c.

101908—DREDGING AND RE-SOILING. M. W. von Bernewitz. (Min. and Sci. Press, Apr. 5, 1919; 1 p., illus.) 20c.

GOLD AND SILVER—GENERAL

101909—ALASKA—The Nelchina-Susitna Region, Alaska. Theodore Chapin. (Bull. 668, U. S. Geol. Surv., 1918; 60 pp., illus.)

101910—ARIZONA—Gold, Silver, Copper, Lead, and Zinc in Arizona in 1917. V. C. Heikes. (Mineral Resources of the U. S., 1917—Part I; 42 pp.)

101911—CHOSEN—The Unsan Mines, Korea. H. J. Evans and K. F. Hoefle. (Min. and Sci. Press, Mar. 29, 1919; 9 pp., illus.) 20c.

101912—NEVADA—The Divide District. Jay A. Carpenter. (Eng. and Min. Journ., May 17, 1919; 3 pp., illus.) 20c.

101913—REFINING—The Electrolytic Refining of Silver and Gold. George G. Griswold. (Eng. and Min. Journ., May 3, 1919; 2 pp., illus.) A paper presented at a meeting of the Am. Electrochem. Soc., April, 1919. 20c.

101914—SOUTH AFRICA—Labor and Gold Mining in South Africa. (Eng. and Min. Journ., May 24, 1919; 4½ pp.) Address delivered by Sir Evelyn A. Wallers, president of the Transvaal Chamber of Mines. 20c.

IRON ORE DEPOSITS, MINING, ETC.

101914a—CANADA—A Proposed Bounty on Canadian Iron Ore. F. W. Gray. (Bull., Can. Min. Inst., May, 1919; 3 pp.) 40c.

101915—LUXEMBOURG—La Question du Luxembourg. (L'Echo Des Mines, Apr. 20 and 27, 1919; 4 pp.)

101916—MINNESOTA—Iron-Ore Super-Taxation in Minnesota. Dwight E. Woodbridge. (Eng. and Min. Journ., May 3, 1919; 4¼ pp., illus.) Abstract of a statement made to the Tax Committee of the House of Representatives, Minnesota Legislature. 20c.

101917—PRODUCTION—Iron Ore, Pig Iron and Steel in 1917. Ernest F. Burchard. (Mineral Resources of the U. S., 1917—Part I; 48 pp.)

IRON AND STEEL—METALLURGY

101918—ACID BESSEMER STEEL—A Technical Study of Acid Bessemer Steel. (Iron Age, Mar. 6, 1919; 2 pp.) Abstract of paper by Richard S. McCaffery, in the "Wisconsin Engineer." 20c.

101919—ELECTRIC FURNACE—The Greene Rolling Cylinder Arc Furnace. (Iron Age, Apr. 17, 1919; 2½ pp., illus.) 20c.

101920—ELECTRIC STEEL FURNACE.—The Vom Baur Electric Steel Furnace. (Iron Age, Apr. 24, 1919; 2 pp., illus.) 20c.

101921—FERROMANGANESE—Production of Ferromanganese in the Blast Furnace. P. H. Royster. (Bull. A. I. M. E., Feb., 1919; 13 pp., illus.) 40c.

101922—FOUNDRY PRACTICE—The Electric Furnace: Its Introduction into Foundry Practice. W. E. Moore. (Advance Copy, Am. Electrochem. Soc., Apr. 5, 1919; 6 pp.)

101923—LUXEMBOURG—La Question du Luxembourg. (L'Echo des Mines, Apr. 20 and 27, 1919; 4 pp.)

101924—OPEN-HEARTH STEEL FURNACES, Water-Cooled Equipment for. Wm. C. Coffin. (Bull. A. I. M. E., Feb., 1919; 18½ pp., illus.) 40c.

101925—PHOSPHORUS—Le Dosage du Phosphore dans les Aciers, les Fontes, les Scories de Déphosphoration. A. Travers. (Chimie & Industrie, Feb. 1, 1919; 8¾ pp.)

101926—PRODUCTION—Iron Ore, Pig Iron and Steel in 1917. Ernest F. Burchard. (Mineral Resources of the U. S., 1917—Part I; 48 pp.)

101927—PULVERIZED COAL in Canadian Steel Plant. C. F. Herington. (Iron Age, Apr. 24, 1919; 5½ pp., illus.) 20c.

LEAD AND ZINC

101928—ARIZONA—Gold, Silver, Copper, Lead, and Zinc in Arizona in 1917. V. C. Heikes. (Mineral Resources of the U. S., in 1917—Part I; 42 pp.)

101929—ECONOMICS of the Zinc Industry: A Prophetic Discussion. Parker C. Choate. (Chem. and Met. Eng., Mar. 1, 1919; 2¼ pp.)

101930—MEXICO—Informe acerca de la "Planta Calcinadora" perteneciente a la International Ore Co., S. A., Saltillo, Coah. (Boletin Minero, Nov. and Dec., 1918; 5 pp.)

101931—RESIDUES—Sintering Zinc Residues. K. Stock. (Chem. and Met. Eng., May 15, 1919; 3½ pp., illus.)

101932—WEST AUSTRALIA—The Northampton Lead-Mining District, West Australia. C. M. Harris. (Min. Mag., Mar., 1919; 3 pp.) 40c.

OTHER METALS

101933—ALUMINUM AND MAGNESIUM—The Metallurgy of Aluminum and Magnesium. H. B. Pulsifer. (Salt Lake Min. Rev., Apr. 30, 1919; 4¾ pp., illus.) 20c.

101934—COBALT, MOLYBDENUM, NICKEL, Titanium, Tungsten, Radium, Uranium, and Vanadium in 1916. Frank L. Hess. (Mineral Resources of the U. S., 1916—Part I; 34 pp.)

101935—IDAHO—Tungsten, Cinnabar, Manganese, Molybdenum, and Tin Deposits of Idaho. D. C. Livingston. (Bull. No. 2, Univ. of Idaho, School of Mines, Jan., 1919; 44¼ pp., illus.)

101936—MANGANESE Ore Deposits in Cuba. Ernest F. Burchard. (Bull. A. I. M. E., Mar., 1919; 4½ pp.) 40c.

101937—MANGANESE: Ores, Uses, Production, Etc. T. G. Trevor. (S. Afr. Journ. of Ind., Jan., 1919; 8½ pp.)

101938—MOLYBDENUM—Preliminary Determination of the Thermal Expansion of Molybdenum. Lloyd W. Schad and Peter Hidnert. (Sci. Paper, U. S. Bureau of Standards No. 332, 1919; 10 pp., illus.)

101939—NICKEL—A Process for Electrolytically Refining Nickel. Geo. A. Guess. (Advance Copy, Am. Electrochem. Soc., Apr., 1919; 4 pp.)

101940—QUICKSILVER—Cinnabar Ore in Jackson County, Oregon. A. E. Kellogg. (Eng. and Min. Journ., May 3, 1919; 1 p., illus.) 20c.

101941—QUICKSILVER—Sobre la Industria Minera del Azogue en Italia y en los Estados Unidos. (Revista Minera, Feb. 16, 1919; 1½ pp.) 40c.

101942—RADIUM Production. Charles H Viol. (Science, Mar. 7, 1919; reprinted in Radium, Apr., 1919; 1½ pp.) 20c.

101943—TIN—Hydraulic Prospecting at the Rooiberg Tin Mines. E. R. Schoch. (Journ. So. Afr. Instn. Engrs., Nov.-Dec., 1918, and Mar., 1919; 10¼ pp.) Original paper and discussion thereof.

101944—TIN—The Mauss Centrifugal Separators. E. M. Weston. (Eng. and Min. Journ., May 17, 1919; 2 pp., illus.) 20c.

101945—URANIUM: Its Extraction From Pitchblende. Gustave Gin. (Advance copy, Am. Electrochem. Soc., Apr. 5, 1919; 6 pp.)

NONMETALLIC MINERALS

101946—GARNET in North Carolina and the Market for Abrasive Garnet. Frank J. Katz. (Eng. and Min. Journ., May 24, 1919; 3½ pp.) 20c.

101947—LIME in 1917. G. F. Loughlin. (Mineral Resources of the U. S., 1917—Part II; 31 pp.)

101948—MAGNESITE, Chromite, and Fireclay at Mount Pring, Bowen. E C. Saint-Smith. (Queensland Govt. Min. Journ., Feb. 15, 1919; 1 p.) 60c.

101949—PHOSPHATE—Fertilizers. B. De C. Marchand. (So. Afr. Journ. of Ind., Oct., 1918; 9½ pp.) Fifth article of series on sources of phosphoric oxide.

101950—POTASH in 1917. Hoyt S. Gale and W. B. Hicks. (Mineral Resources of the U. S., 1917—Part II; 88 pp.)

PETROLEUM AND NATURAL GAS

101951—ALBERTA—Oil Production, Sheep River Area. S. E. Slipper. (Summary Report, Can. Geol. Surv., 1917—Part C.; 3 pp.)

101952—ANALYSIS—Estimation of Benzene and Toluene in Petroleum. F. D. Thole. (Journ. Soc. of Chem. Ind., Feb. 28, 1919; 2¼ pp.)

101953—CO-OPERATION in the Petroleum Industry. M. L. Requa. (Address before the National Petroleum Congress, Mar. 27, 1919; 31 pp.)

101954—RECORDS—The Use of the Graphic Well Log. Hugh A. Maeier. (Min. and Oil Bull., Apr., 1919; 3 pp.)

101955—TEXAS—The Oil Fields of Northeastern Texas. W. L. Watts. (Min. and Oil Bull., Apr., 1919; 4 pp., illus.) 20c.

ECONOMIC GEOLOGY—GENERAL

101956—IGNEOUS ROCKS—A Description of the Quantitative Classification of Igneous Rocks, with Tables for the Calculation of the Norm. Henry Stephens Washington. (U. S. Geol. Surv., Extract from Prof. Paper 99, 1918; 36 pp.)

101957—ONTARIO—Notes on Lake Abitibi Area. Percy E. Hopkins. (Ann. Report Ont. Bureau of Mines, 1918; 15 pp., illus.)

MINING LAW

101958—MINING RIGHTS—Peculiar Mining Rights. Chesla C. Sherlock. (Eng. and Min. Journ., Mar. 29, 1919; 1 p.) 20c.

101958—UNIFORM MINING LAW for North America. T. E. Godson. (Bull. A. I. M. E., Apr., 1919; 12½ pp.) 40c.

MINING—GENERAL

101959—ACCIDENTS—Quarry Accidents in the United States. Albert H. Fay. (U. S. Bureau of Mines, Tech. paper 213; 1919; 59 pp.)

101960—ACCIDENTS—The Geophone. (Eng. and Min. Journ., May 17, 1919; 1 p., illus.) Describes a "listening" instrument now being used by the Bureau of Mines to aid in locating entombed miners. 20c.

101961—BLASTING—The Prevention of Misfires. Grant H. Tod. (Min. and Sci. Press, Apr. 12, 1919; 1 p.) 20c.

101962—BRITISH COLUMBIA—A Quarter Century of Mining in British Columbia. E. A. Haggen. (Min. and Eng. Rec., Jan., 1919; 5 pp.) 60c.

101963—BUREAU OF MINES—The Pittsburgh Bureau of Mines, Experiment Station. (Eng. and Min. Journ., May 24, 1919; 3¼ pp., illus.)

101964—DRILLING—The Blow of the Drill Bit, Sharp or Dull. Frank Richards. (Eng. and Min. Journ., Apr. 26, 1919; 1½ pp.) 20c.

101965—EDUCATION—Teaching Discharged Soldiers Mining. Francis A. Thomson. (Eng. and Min. Journ., Apr. 26, 1919; ¾ p.) 20c.

101966—HOISTING—Monorail and Monocable Hoisting. C. C. Hoke. (Eng. and Min. Journ., Apr. 26, 1919; 1 p., illus.) 20c.

101967—PROSPECTS—Ventilation for Prospects. Charles E. Dutton. (Eng. and Min. Journ., May 24, 1919; ¾ p., illus.) 20c.

101968—QUEENSLAND Mining Industry; Review of the Year 1918. (Queensland Govt. Min. Journ., Mar. 15, 1919; 16 pp.) 60c.

101969—RHODESIA—Minerals from Rhodesia. (Bull. Imp. Inst., Oct.-Dec., 1918; 20½ pp.) Statistics of production, and notes on occurrence of various minerals. 40c.

101969a—SHOVELING—A Study of Shoveling as Applied to Mining. G. Townsend Harley. (Bull. A. I. M. E., Feb., 1919.) 40c.

101969b—TAXATION—Depletion of Mineral Deposits and the Federal Income Tax. (Eng. and Min. Journ., Apr. 26, 1919; 2 pp.) An abstract from a paper presented by Paul Armitage at meeting Min. and Met. Soc. of Am.

101970—TAXATION—Principles of Mining Taxation. Thos. W. Gibson. (Bull. A. I. M. E., Apr., 1919; 9¼ pp.; also Bull. Can. Min. Inst., Mar., 1919.) 40c.

FLOTATION

101971—EXPERIMENTS—A Device for Flotation Experiments. Will H. Coghill. (Min. and Sci. Press, Apr. 12, 1919; 1¼ pp., illus.) 20c.

101972—FROTH REMOVAL from Flotation Cells. Claude T. Rice. (Eng. and Min. Journ., Apr. 26, 1919; ¾ p.) 20c.

ORE DRESSING—GENERAL

101973—CONTROL of Ore-Dressing Operations. George J. Young. (Eng. and Min. Journ., May 24, 1919; 1½ pp.) 20c.

101974—ECONOMICS of Concentration. A. P. Watt. (Eng. and Min. Journ., May 3, 1919; 5 pp., illus.) 20c.

101975—SEPARATORS—The Mauss Centrifugal Separators. E. M. Weston. (Eng. and Min. Journ., May 17, 1919; 2 pp., illus.) 20c.

METALLURGY—GENERAL

101976—ACCIDENTS—Les Accidents Causés par l'électricite dans les Mines, Minières, Carrières et Usines Métallurgiques, (pendant les Années, 1913 à 1915). Joseph Libert. (Ann. des Mines de Belgique, Vol. 20, Part I, 1919; 35 pp.)

101977—CORROSION—Fourth Report to the Corrosion Committee of the Institute of Metals. Guy D. Bengough and O. F. Hudson. (Advance copy, Inst. of Metals, Mar. 25, 1919; 9 pp.)

101978—CRUCIBLES—The Use and Abuse of Crucibles. A. C. Bowles. (Min. and Sci. Press, Apr. 12, 1919; 1½ pp., illus.) 20c.

101979—LABORATORY—The Scope of the Works Laboratory. Fred C. A. H. Lantsberry. (Advance copy, Inst. of Metals, Mar. 26, 1919; 7½ pp.)

101980—REFRACTORY BRICKS—Preventable Defects in Refractory Bricks. C. E. Nesbitt and M. L. Bell. (Advance copy, Am. Soc. for Test. Materials, June 27, 1919; 13½ pp., illus.)

101981—SINTERING—Recent Improvements in Sintering Equipment and Practice. (Eng. and Min. Journ., Apr. 26, 1919; 1½ pp., illus.) 20c.

FUELS

(See also "Petroleum and Natural Gas")

101982—COKE—Precautions Necessary in Grinding Samples of Coke for Analysis. A. E. Findley. (Journ. Soc. Chem. Ind., Apr. 15, 1919; 1½ pp.)

101983—FUEL BRIQUETTING in 1918. C. E. Lesher. (Mineral Resources of the U. S., 1918—Part II; 3 pp.)

101984—GASOLINE—Motor Gasoline; Properties, Laboratory Methods of Testing, and Practical Specifications. E. W. Dean. (Tech. Paper 214, U. S. Bureau of Mines, 1919; 33 pp., illus.)

101985—LIGNITE—Notes on Lignite, Its Characteristics and Utilization. S. M. Darling. (Tech. Paper 178, U. S. Bureau of Mines; 18¼ pp.)

101986—NATURAL-GAS GASOLINE in 1917. John D. Northrop. (Mineral Resources of the U. S., 1917—Part II; 22 pp.)

101987—PULVERIZED COAL in Canadian Steel Plant. C. F. Herington. (Iron Age, Apr. 24, 1919; 4¾ pp., illus.) 20c.

101988—U. S. FUEL ADMINISTRATION—Work of the National Production Committee of U. S. Fuel Administration. James B. Neale. (Bull. A. I. M. E., Feb., 1919; 5¼ pp.) 40c.

MINING AND METALLURGICAL MACHINERY

101989—BELTING—Specifications for Leather Belting. Harry A. Hey. (Ind. Management, Apr., 1919; 6 pp., illus.) Twelve requirements to control quality from viewpoint of use. 20c.

101990—CRANES AND HOISTS—Speed Control of Induction Motors and Cranes and Hoists by Means of Solenoid Load Brakes. R. H. McLain and H. H. Vernon. (Gen. Elec. Rev., Feb., 1919; 10 pp., illus.) 40c.

101991—ELECTRIC FURNACES of the Resistance Type Used in the Production of Essential War Materials. T. F. Baily. (Advance copy, Am. Electrochem. Soc., Apr. 5, 1919; 4 pp., illus.)

101992—REPAIRS—Thermit Repairs to a Rock Crusher. (Eng. and Min. Journ., May 10, 1919; 1 p., illus.) 20c.

101993—TURBO-BLOWER—Improved Turbo-Blower Unit at International Nickel Co. Plant. W. L. Wotherspoon. (Eng. and Min. Journ., May 17, 1919; 1 p., illus.) 20c.

101994—WELDING—Oxy-Acetylene Welding. J. H. Davies. (Engineering, Feb. 7, 1919; 1¼ pp.) Paper before Instn. of Mechan. Engrs. 40c.

101995—WIRE ROPE—Investigation of Wire Rope. J. H. Griffith. (Eng. and Min. Journ., Apr. 26, 1919; 1 p.) Abstract of a report by the U. S. Bureau of Standards. 20c.

INDUSTRIAL CHEMISTRY

101996—CHLORINE—The Future of Electrolytic Chlorine. A. H. Hooker. (Advance copy, Am. Electrochem. Soc., Oct. 1, 1918; 5¼ pp.)

101997—COAL BYPRODUCTS—Coal: Its Value as a Raw Material for Distillation Products. J. A. Wilkinson. (So. Afr. Journ. of Ind., Feb. and Mar., 1919; 15 pp.) 80c.

101998—NITROGEN—How the Nitrogen Problem Has Been Solved. Henry J. M. Creighton. (Journ. Franklin Inst., Apr., 1919; 26 pp., illus.; to be concluded.) 60c.

101999—SULPHURIC-ACID INDUSTRY, The. M. Rindl. (So. Afr. Journ. of Ind., Feb., 1919; 10 pp.) 40c.

MATERIALS OF CONSTRUCTION

102000—CEMENT—Influence of Gypsum on the Blast-Furnace Slags in the Manufacture of Cement. Euphime Bereslavsky. (Chem. and Met. Eng., Jan. 1, 1919; 3½ pp.) A report on the granulated slag-lime-gypsum composition cements as developed in Russia.

102001—CONCRETE—Proportioning of Pit-Run Gravel for Concrete. R. W. Crum. (Advance copy, Am. Soc. for Test. Materials, June 27, 1919; 17½ pp.)

MISCELLANEOUS

102002—CAPITAL—Nature and Uses of Capital in Mining. J. R. Finlay. (Eng. and Min. Journ., May 3, 1919; 6¾ pp.) 20c.

102003—LABOR—Industrial Coöperation. Charles P. Steinmetz. (Eng. and Min. Journ., Apr. 26, 1919; 2 pp.) A speech delivered at a special session of the Editorial Conference. 20c.

102004—LABOR—Mental Factors in Industrial Organization. Thomas T. Read. (Bull. A. I. M. E., Feb., 1919; 4¼ pp.) 40c.

102005—LABOR—Notes on the Housing Problem. Charles Willis. (Eng. and Min. Journ., May 17, 1919; 1¾ pp.) 20c.

102006—LABOR—Organization in the Settlement of Industrial Disputes. V. Everit Macy. (Eng. and Min. Journ., May 10, 1918; 3¼ pp.) Abstracts of an address at the Industrial Conference of New York Business Publishers' Assn. 20c.

102007—LABOR—Principles of Employing Labor. E. H. Fish. (Ind. Management, Mar. and Apr., 1919; 9½ pp.) 20c.

102008—LABOR—Reëducation vs. Compensation for Crippled Men. Douglas C. McMurtrie. (Eng. and Min. Journ., Mar. 15, 1919; 2¾ pp.) 20c.

102009—LABOR—Social Betterment in Arizona. A. H. Heckman. (Min. and Sci. Press, Feb. 1, 1919; 2¼ pp.) 20c.

102010—LABOR—The Eight-Hour Day Defined. (Eng. and Min. Journ., Feb. 8, 1919; 2¼ pp.) Abstract from Research Report No. 11, issued by the National Industrial Conference Board. 20c.

102011—LABOR—Use of Cripples in Industry. James P. Munroe. (Bull. A. I. M. E., Jan., 1919; 3 pp.)

102012—MANITOBA—Water Power Resources of Manitoba. M. C. Hendry. (From a pamphlet on Manitoba's Northland, published Nov., 1918; 8 pp., illus.)

102013—MEASURING WATER—Orifice Bucket for Measuring Water. (Eng. and Min. Journ., Mar. 29, 1919; 1¼ pp., illus.) Abstract from Bull. 105, Eng. Experiment Station, University of Ill. 20c.

102014—MEXICAN SITUATION, The. (Eng. and Min. Journ., Mar. 22, 1919; 1¾ pp.) 20c.

102015—MEXICO—Early Indian Raids on Mexico. J. B. Tyrrell. (Eng. and Min. Journ., Mar. 15, 1919; 2¾ pp.) 20c.

102016—MEXICO from Within. (Eng. and Min. Journ., Mar. 22, 1919; 1¾ pp.) 20c.

102017—MEXICO—Improved Conditions in Western Mexico. Bennett R. Bates. (Eng. and Min. Journ., May 10, 1919; ¾ p.) 20c.

102018—PRICES—The New Price Revolution. Irving Fisher. (Eng. and Min. Journ., May 10, 1919; 1 p.) Extracts from a paper read before a conference of governors and mayors at the White House. 20c.

102019—RAILROAD PROBLEM—One Phase of the Railroad Problem. N. H. Emmons 2d. (Min. and Sci. Press, Feb. 8, 1919; 1¼ pp.) Suggestions regarding freight rates, and their fixing. 20c.

Personals

Harry J. Wolf is in New York.

A. W. Allen will sail from New York on June 13, for Chile as chief engineer for the Penyon Syndicate.

George K. Kimball, of Idaho Springs, Colo., is making examinations in the Lordsburg, N. M., district.

D. C. Jackling, president of Ray Consolidated, has been visiting the company's mines at Ray and its mill at Hayden.

Col. J. C. Rankin, who is planning deep tunneling in the Chloride, Ariz., district, was a recent visitor in Chicago.

Merton S. Kingston, mining engineer and operator, of Virginia, Minn., was in New York recently.

William W. Logan has gone to Alaska to take charge of the cyanide plant of the Gold Bullion Mining Co., at Willow Creek.

Bruno V. Hordberg recently visited the Lake Superior copper district, and has returned to Milwaukee.

Edward Keller has gone to Colorado, where he will spend several months, with headquarters at Montrose.

Charles E. Adams, former manager of Ray Hercules Mining Co. has gone to inspect tracts in the Texas oil fields.

Ira B. Jaralomen, geologist for Calumet & Arizona Copper Co., was in El Paso for a few days recently.

Charles Warner, director 85 Mine, has gone to Chicago to arrange the details of the steam plant at the mine.

J. B. Tyrrell, mining engineer of Toronto, is in the Kirkland Lake gold district, examining the Buffalo Kirkland, Hudson Kirkland, and other properties.

T. W. Osgood has been appointed superintendent of safety at the Los Angeles branch of the California State Industrial Commission.

E. E. Hunner, general manager of M. A. Hanna & Co.'s northern ore-mining interests, has successfully undergone an operation at Johns Hopkins Hospital, Baltimore.

Paul D. Willard, representative of the Day mining interests in Minnesota, has returned from a winter's vacation in California.

R. N. Dickman, of Chicago, recently examined the property of the Illinois Exploration Co. and the Gold Road Bonanza, in Mohave County, Arizona.

A. P. Watt, consulting engineer of New York, has returned from Colorado, where he has been in the interest of New York clients.

E. K. Soper, formerly dean of the Oregon School of Mines, at Corvallis, is now geologist for the Trinidad Petroleum Development Co., Port of Spain, Trinidad, B. W. I.

Harry F. Fay, president of the Mayflower-Old Colony Copper Co., has returned to Boston, following a visit to the Lake Superior copper district.

E. H. Clarke, president of the Homestake company, spent a few days in Lead, S. D., on his way from San Francisco to New York City.

Clarence Woods will be engaged until about the middle of June examining Antigua silver mines near Hermosillo, Senora, Mexico, for American clients.

C. S. Kirkpatrick, purchasing agent for El Tigre Mining Co., in northeast Sonora, has gone East on business. He reports conditions at the property as quiet and safe.

R. E. VanDruff, president, Boston-Hecla Mining Co., at Lordsburg, N. M., and who is an oil geologist, is in Fort Worth reporting upon oil areas in New Mexico.

Robert Fitz, of Los Angeles, is in Lordsburg, N. M., to attend the annual meeting of the El Centro M. & M. Co., of which he is president.

Edward Hoops, secretary of the San Toy Co. and Charles McKnight, of Pittsburgh, are in Lordsburgh, N. M., to inspect the Last Chance property.

Alfred R. Whitman, mining geologist, of New York, has been making an examination in the West Shining Tree gold area of northern Ontario.

E. P. Mathewson of New York, a director of the American Smelting and Refining Co., recently visited the plant of the Tacoma Smelting Co. on a tour of inspection of the company's reduction works.

C. W. Newton, manager and director of the Consolidated Interstate-Callahan Mining Co. at Wallace, Idaho, was recently in New York City attending the annual meeting of the company.

H. B. Patton, of Denver, formerly of the Colorado School of Mines and at present chief geologist for the Missouri, Pacific Ry., is making examinations in the Tularosa basin in Otero County, N. M.

Floyd W. Parsons has resigned as editor of the "Coal Age" after serving nearly eight years, since the inception of the publication, to conduct a weekly "Business and Science" department of the "Saturday Evening Post."

Frank M. Smith, general manager of the East Helena Smeltery, in Montana, has announced his leaving the plant on July 1, but he will still remain in the employ of the American Smelting and Refining Company.

Curtis Pigott has been appointed assistant superintendent of the A., S. & R. Co. plant at Monterey, Mexico. Mr. Pigott was formerly assistant superintendent with the United States Smelting, Refining and Mining Co. at Midvale, Utah.

C. L. Brower, chief engineer of the Chrome, N. J., plant of the United States Smelting, Refining and Mining Co., has resigned his position after 17 years of employment with the company. **I. V. Reese** has been appointed acting chief engineer.

A. E. Graupner has been appointed attorney for the California State Industrial Accident Commission at San Francisco, succeeding **C. M. Bradley,** resigned, who was attorney for the commission from the time of its organization.

Alfred A. Watson has returned from Spain, where he was engaged in the erection of a concentrating plant for the treatment of tin and wolfram ores. His present address is 81 Fourth St., New Dorp, Staten Island, New York; P. O. Box 156.

Oscar V. White has resumed his former position as general superintendent of the Silversmith Mines, Ltd. Mr. White is also supervising the Wakefield, near Silverton. B. C., for Clarence Cunningham, of Spokane.

A. H. Burroughs, Jr., mining engineer of New York, has been added to the staff of the Armstead Mines, Talache, Idaho. With **O. H. Hofstrand,** he is working on the flow sheet of the new mill to be built at Talache.

G. E. Stowell, assistant engineer for the Oregon Bureau of Mines and Geology, has returned to Portland. For the last two months he has been at the Seattle station of the U. S. Bureau of Mines, carrying on experimental work.

Martin Schwerin has been appointed general manager of the Spar Mountain Mining Co., at Cave-in-Rock, Hardin County, Ill., which will be his address for some time. although his permanent address remains. as heretofore, at 42 Broadway, New York City.

G. M. Butler, dean of the School of Engineering, University of Arizona, addressed the Southwestern Society of Engineers in El Paso, May 30, on the subject of oil geology. He has recently returned from an extensive study of the new Texas oil fields.

Dorsey A. Lyon, supervisor of experiment stations for the U. S. Bureau of Mines, was in Seattle last week on an inspection trip of the Northwest Station. This station is situated on the University of Washington campus and works under a coöperative agreement with the College of Mines.

James F. McClelland, professor of mining and metallurgy of the Sheffield School of Yale University and director of engineering research of the Hammond laboratory, has joined the staff of the industrial department of the Liberty National Bank, New York, as consulting engineer for the bank and the Liberty Securities Corporation.

Societies

Canadian National Clay Products Association held the 17th annual convention at Montreal, May 26 and 27. The following officers were elected: President, W. M. Burgess, Todmorden, Ontario; vice-presidents, Ryland H. New, Hamilton, Ontario; Millard F. Gibson, Toronto, and T. H. Graham, Englewood, Ontario; secretary-treasurer, Gordon G. Keible, Toronto; Councillors, J. S. McConnell, Milton, Ontario; N. T. Gagnon, Montreal; W. H. Freeborn, Brandford; H. H. Hallatt, Tilbury, Ontario; F. B. Farran, Toronto; C. B. Lewis, Toronto; C. A. Millard, Toronto, and Andrew Dods, Mimico, Ontario.

Industrial News

Amercian Cement Co., Keokuk, Iowa, has issued a new catalog showing the company's line of cement mixers. A special drive is described, the advantages of which are more strengthening on account of massive semi-steel gear made in two pieces and the pinion being racked with removable case-hardened steel pins and rollers. Also no loose or climbing chain or noisy quickly worn-out teeth, as in gear drive, nor sending gears to factory or having to tear machine down to get gears off for welding teeth, with resultant lost time.

The Black & Decker Manufacturing Co., Baltimore, Md., recently added a new size to its line of portable electric drills. This is a drill with a capacity of 0 to 9/16-in. in steel, and is provided with a No. 1 Morse taper socket. It will drill a 9/16-in. hole through machine steel at a rate of 1½ in. per min. without overloading the motor. In tests, pressure up to 500 lb. has been applied without stalling the drill. The housing is of Magnalite, an aluminum alloy of great tensile strength. Gears are packed in grease in a separate grease-tight compartment similar to an automobile transmission, and the drill spindle runs in a long bronze bushing and against a ball thrust bearing. Motor is air cooled, and, in testing, these drills have run continuously for 14 weeks, day and night, including Sundays and holidays, stopping only to renew brushes. The weight is 21 lb.; no-load speed is 600 r.p.m. An interesting feature of this tool is the attachment of the Morse taper socket. This is in the form of a separable sleeve secured in the drill spindle by means of a large knurled nut. By unscrewing this nut the entire taper socket is easily removed from the spindle. The drill shank protrudes slightly beyond the end of the taper socket, and a little tap on the end of the protruding drill shank frees it from the socket.

Material Handling Machinery Manufacturers' Association, 35 West 39th St., New York, announces a coalition meeting at the Hotel Astor on June 11. This includes all manufacturers of cranes, winches and hoists; elevators; gravity and power-conveying machinery and apparatus; industrial trucks, tractors and trailers; bulk handling machinery; and all makers of equipment and accessories such as storage batteries, bearings, ropes for hoists, buckets, electric controllers and apparatus. The advertising managers of the companies manufacturing these products are also invited to hold a preliminary conference at the Hotel Astor on the evening of Tuesday, June 10, beginning at 8 o'clock, at which time it is planned to form an advertising council of the Material Handling Machinery Manufacturers. A general "forum" discussion will be conducted in the afternoon. All manufacturers will be asked to participate in this. The discussion will take up the subject of ways and means for promoting a more general knowledge of the economies which may be effected through the use of mechanical handling equipment, the advisibility in conserving physical energy through the use of mechanical handling; the bearing which modern machinery has on the subject of foreign trade, and kindred topics.

New Patents

United States patent specifications may be obtained from "The Engineering and Mining Journal" at 25c. each.

Blasting—Tool for Miners' and Blasters' Use. Edward Godfrey, Montreal, Quebec, Canada, assignor to Canadian Explosives, Montreal, Canada. (U. S. No. 1,300,834; Apr. 15, 1919.)

Conveyors—Belt-Tightener for Conveyors. John H. Gilman and Albert E. Gilman, Ottawa, Ill., assignors to King & Hamilton, Ottawa, Ill. (U. S. No. 1,299,701; Apr. 8, 1919.)

Dredging—Nozzle for Sand Pumps. George E. Battisfore, Marquette, Mich. (U. S. No. 1,298,642; Apr. 1, 1919.)

Drill—Rock Drill. Thomas Gordon and Hugh William Simpson, Parson's Bridge, Vancouver Island, B. C. (U. S. No. 1,301,-121; Apr. 22, 1919.)

Drill Sharpener. Jesse Ditson, Littleton, Colo., assignor to the J. Geo. Leyner Engineering Works Co., Littleton, Colo. (U. S. No. 1,302,019; Apr. 29, 1919.)

Editorial Correspondence

SAN FRANCISCO, CALIF.—May 29

Comstock Northend Reports for the week ended May 24 show total shipments to Mexican mill from Consolidated Virginia and Ophir amounting to 591 tons, of a total value of $14,476. Consolidated Virginia ore showed an average assay of $26.10 and Ophir, $22.35. Important improvement was shown in development in these mines and also in Mexican, Union, and Sierra Nevada.

Quicksilver Production in California decreased rapidly since the armistice was signed. During the later part of 1918 it is probable that the output reached 2000 flasks a month, but at the present time not more than 500 flasks a month are being produced. The continued demand for the last few weeks has again stimulated production, and the New Idria Quicksilver Mining Co., whose mines are in San Benito County, is again starting work after a shutdown of several months. From 250 to 300 men will be employed when the furnaces are running to capacity.

DENVER, COLO.—May 29

Junking of the Denver, Boulder & Western Ry. may be avoided if the increase in tonnage from the mines of the Crisman, Salina and Caribou districts of Boulder County continues. Revival of activity in the camp served by this road will no doubt influence the state Public Uutilities Commission to reserve judgment of a character unfavorable to the local mining industry. It now appears that numerous properties are being reopened under lease, and considerable development work has been undertaken, particularly at the Yellow Pine and Logan properties. Certain prospects are to be developed by Denver and New York capital, and the installation of considerable light mining equipment is under consideration. Lessees are becoming more active, and their operations are being reflected in the gradual increase in the quantity of ore produced. Every effort is being made by local operators to demonstrate by actual ore production the importance of maintaining the railroad in operation.

SALT LAKE CITY, UTAH—May 31

Park City Mines Are Still Closed Down, and the men are idle, but the strike appears to be wearing out, and an apparent desire on the part of the men to return to work is making itself felt. A committee of strikers seeking to meet some of the employers was refused audience, the ground taken being that any dealings with the strikers as a body would be interpreted as a recognition of the I. W. W., and that the matters to be settled lay entirely between individual operators and employees of the mines in question.

WALLACE, IDAHO—May 29

Lead and Silver Production for May compared with the average monthly production during the year 1918 indicates that the mines are now operating on a basis of between 60 and 65% of normal capacity. In the matter of zinc production, the district has practically ceased to be a factor, the only output being the amount recovered as a byproduct in connection with the lead mines, which is placed at about 5 or 6% of the average production last year. This situation is explained first through the collapse of the market for lead and zinc, following the signing of the armistice, and then by the shortage of labor, which holds production down even below what it would be even under the adverse market conditions. However, there are evidences of improvement in both respects. Operators are encouraged by the stronger demand for lead in the last week, and the higher price of silver has made a substantial addition to the profits. The advance in the rate of wages from $4.25 to $4.75 is having a beneficial effect, as indicated by the arrival of men seeking work. The scarcity of good miners is the chief trouble at this time. It is estimated that the actual shortage of men of all classes for underground work is fully 1000.

Optimism Prevails in the Coeur d'Alene district, owing to the belief that the outlook for zinc has improved. C. W. Newton, manager of the Consolidated Interstate-Callahan Mining Co., on his return from New York, where he attended a meeting of the directors of the company, expressed the opinion that spelter would soon go to 7c. and would probably remain around that level, at which figure there would be a fair profit in zinc mining, even with the present high costs. Therefore, with this encouraging outlook, improvements are being made to facilitate handling Interstate-Callahan ore which will place the company in position to resume operations without delay when market conditions are favorable. A new sorting plant is being built at the mine, where the waste rock will be removed from the ore before it passes to the tramway. The sorting plant at the mill will then be used exclusively for recovering the high-grade ore for shipment crude. Additional ball mills will be placed in the mill and several flotation cells also added. The mine is in excellent condition for production, and, with these improvements completed, the company will be ready for immediate operation when the market for zinc is sufficiently restored.

DULUTH, MINN.—May 31

Conditions on the Iron Ranges of Minnesota during May remained unchanged. The Steel Corporation continued to be the only operator working at capacity, its shipments nearly taxing to the full limit the carrying ability of its large fleet. Independent operators continue to be cautious, some shipping slowly, some at a fair rate, and some not at all. The state of mind seems to be entirely a waiting policy, and no gloom is in evidence. Organizations are being maintained except for the commonest labor. Unemployment is negligible.

U. S. Bureau of Mines will hold a conference at Duluth, June 19-20, at which the general subject of mine inspection and mine safety will come under discussion and to which all mine inspectors and mine managers have been invited. The conference will be in charge of B. O. Pickard, mining engineer, who looks after the interests of the Bureau in the district, and from assurances now held by him it is indicated that at least 100 mining men from Michigan, Minnesota, and Wisconsin will attend the meeting. It is of interest in this connection that the state industrial commission of Wisconsin has agreed to co-operate with the Bureau of Mines, and the Bureau is asked to name a state mine inspector and two assistants, the industrial commission to share the expense with the Bureau. This is the first step taken by Wisconsin in mine inspection and mine safety work which has proved so beneficial in Michigan and Minnesota, and it is expected that the zinc and other mines and the stone quarries of that state will quickly show the advantages of the system.

HOUGHTON, MICH.—May 31

Shipments of Copper have equaled the output of mines during the last week, and no inroads into the surplus at the mines of the district have been made. The policy of 50% curtailment in production will be evident in the June outputs, and the total for the district will be lower in that month than at any time since the strike, although this will not show itself in the figures of the Mohawk, Wolverine and Quincy, or the Copper Range mines, Baltic, Champion and Tri-mountain, as these properties are producing at approximately 85% of their best normal figures.

JOPLIN, MO.—May 31

A Two-Cent per Pound Tariff on zinc ore is to be sought by the mining and business men of this district. At a meeting held in Joplin this week, T. J. Franks, of this city, was made chairman of a committee that will send a delegation to Washington to work for the tariff. A bill providing this high tariff has been introduced by Congressman McPherson, of this district.

Decision Not To Exhaust Orebodies at existing low prices for zinc, caused the Butte-Kansas Mining Co. to close down its two mills and mines at Waco, Mo., on May 31. L. P. Buchanan, of Joplin, manager for the company, stated the mines would not be started up until ore prices improve decidedly, though the mines have been running regularly and have been showing a small margin of profit every week. The High Five Mining Co. has a new mill built upon a rich prospect just across the state line from the Butte-Kansas No. 1 mine, and the plant is ready for operation, but it will not be started until ore prices improve.

PHOENIX, ARIZ.—May 28

High Transportation Costs on bullion and supplies now paid by the Arizona copper producers may be the reason why surveyors have been put in the field between Ajo and San Jorge Bay on the Gulf of California, a distance of about 100 miles, with apparent intention of extending the 42-mile Gila Bend-Ajo railroad to tidewater. The line is crossed at Quitovaquita. No announcement has been made of any railroad concession by the Mexican authorities for such a railroad.

Little Non-Employment is apparent in Arizona, though the larger mines are hardly on half-force conditions. Soldiers returning have jobs at once, the local soldiers' club having found places for 500. Globe and Miami are reported short 750 men, needed mainly for development work. Jerome needs many expert miners, on its resumption of production. Employment is being given, however, only after strict examination concerning health, capability, and character, with the object of eliminating both incompetents and malcontents. At the possible expense of production, an effort is being made to work the Arizona mines with only the best class of employees. Thousands of former workmen have gone to the Texas oil fields.

WASHINGTON, D. C.—June 2

Three Leasing Bills have been introduced in the House by Congressman Taylor, of Colorado (H. R. 183); Ferris, of Oklahoma (H. R. 496), and Raker, of California (H. R. 293), all of which are identical in language and are in text practically the same as the bill as agreed upon by the conference committee at the last session. Congressman Taylor, however, has introduced separate bills for coal and oil-shale leases, these being identical with the coal and oil-shale sections of his general leasing bill.

VANCOUVER, B. C.—May 29

Representatives of the Dolly Varden Mining Co., whose property is situated in the Alice Arm district, intend to appeal to the dominion government for the disallowance of the provincial legislation which gives the Taylor Engineering Co. power to take over the mine and other of the company's holdings in order to satisfy claims it has presented in respect to the construction of a line of railway from Alice Arm to the mine, according to authoritative information. It already has been reported that the time given the Dolly Varden company to meet the financial terms laid down by the Legislature has lapsed and that the Taylor Engineering Co. is proceeding to take possession.

LONDON, ENGLAND—May 31

Oil Found in England for the first time was reported in substantial quantities and of high quality at Chesterfield, in Derbyshire. Drilling began last October. The discovery was made in Hardstoft No. 1 boring at a depth of 3000 ft. The oil rose to a height of 50 ft. The discovery is due to Lord Cowdray and his experts, who are working as agents of the government, the firm giving the services of the staff free of charge, the other expenses being assumed by the government. The experimental borings were made on information gathered by Lord Cowdray and given by him to the government. A condition of the gift was the stipulation that promiscuous drilling should be prohibited, which has been done.

The Mining News

ARIZONA

Gila County

CASTLE DOME (Globe)—New York company drilling on Gold Creek, 16 miles west of Globe, finding much 4% chalcocite, with 350-ft. tunnel in ore for most of its length.

JUMBO (Globe)—Small cyanide plant being built below mill, to treat silver ores. Operating company, a Texas one, represented by W. T. Bessonnette, of Waco.

GREATER MIAMI (Miami)—New company organized with added Eastern capital, with guarantee of $2500 a month for development costs and possible mill erection.

MIAMI M. & M. (Miami)—Building 50-ton mill at new town of Doak on railroad.

Mohave County

GOLD DYKE, discovered by G. H. Roberts, 12 miles west of Chloride; mineralized ground 300 ft. wide, with stringers of rich ore. Original discovery optioned to J. H. Townsend and W. J. Cook, who are developing.

CHLORIDE TUNNEL (Chloride)—Enterprise capitalized by J. C. Rankin, to drive 10,000 ft. under eight developed silver groups, with expectation large mill will be built at portal.

CHLORIDE QUEEN (Chloride)—High-grade silver ore cut on 200 level.

HACKBERRY (Hackberry)—Mill handling 80 tons daily in one ten-hour shift, effective flotation, leaving only 80 cents a ton in tailings. Company capitalization being increased to secure added development and continuous mill operation.

WASHINGTON-ARIZONA (Kingman)—Opening stopes for mill run.

Pima County

W. B. HAGER has found gold ore at 8 ft. depth in 11-in. vein, two miles north of Gunsight.

EL TIRO (Silverbell)—The 300 level unwatered by lifting 7,000,000 gal. Percy Williams, manager, resumed shipment of ore averaging 8% copper. Production costs believed lowest known at all small southwestern producers, as ore goes direct to railroad car from shaft.

YELLOW BIRD (Tucson)—Local company headed by S. W. Purcell planning for silver-lead furnace for property 32 miles southwest of city.

Santa Cruz County

BLAND (Alto)—Owners, F. T. McGinley, W. S. Smith, and J. W. Garden, planning erection of mill. Property in Alto section now leased to McGinley.

AMERICAN BOY (Patagonia)—Building new wagon road and sinking double-compartment shaft, now about 60 ft. deep.

GREAT SILVER (Patagonia)—Under development by J. W. Wilson, of Nogales, and George F. Wieland, of Patagonia.

HARDSHELL (Patagonia)—Sinking 500-ft. shaft on property near Harshaw.

Yavapai County

GREEN MONSTER (Jerome)—Work to be resumed at once under Manager W. S. Humbert, with headquarters moved to Jerome from Phoenix. Water, 200 ft. deep, will be pumped from main 930-ft. shaft and exploration resumed on lower levels and on an incline shaft on Silver Tip claim, where an 18-in. silver-copper vein will be followed.

BIG PINE (Prescott)—Work to be resumed on property near Senator, under C. H. Dunning.

CALIFORNIA

Amador County

ARGONAUT (Jackson)—Reported fire now under complete control, and full crew being put to work as rapidly as conditions allow. Effect of temporary closing down for several weeks, and short closing down of Kennedy on account of the Argonaut fire, has been to reduce largely circulation of miners' wages among the merchandise stores of Jackson. The two payrolls approximate $30,000 per month and are the chief support of the town.

Inyo County

KEARSAGE (Independence)—Practically idle since 1870. Recently passed into control of P. C. Montgomery and associates.

CERRO GORDO (Keeler)—Large shipments of high-grade silver-lead and zinc ore being made regularly. New delevopment in virgin ground shows excellent results.

Kern County

YELLOW ASTOR (Randsburg)—Operations to be resumed after a shutdown of approximately six months.

Riverside County

HEMET (Hemet)—Ore reserves at magnesite mine south of Hemet said to be exhausted and work temporarily suspended.

San Bernardino County

RUNOVER (Calico)—Revival of this old silver district looks encouraging. Lane now shipping good grade of ore from Runover.

Shasta County

KEYSTONE (Kennet)—Twenty men employed in development. Shows unusual promise, and will be put in condition for heavy output.

IGO DISTRICT (Redding)—Old workings being reopened in the Silver King, Silver Falls, and Chicago properties.

Sierra County

ALHAMBRA AND SOVEREIGN (Downieville)—Gold Exploration Co., of Salt Lake City, has completed arrangements for extensive development.

MONARCH (Sierra City)—Twenty stamp mill running on good-grade ore from newly opened workings

IDAHO

Shoshone County

CEDAR CREEK (Murray)—Nine feet concentrating ore in east drift, mostly zinc, with several streaks of galena. Lead ore in two upper tunnels.

BULLION (Wallace)—Work resumed after suspension during war. Showing of ore in face of east drift indicates approach to large body of commercial copper ore disclosed in winze from upper tunnel and which has also been determined by diamond drill.

TAMARACK & CUSTER (Wallace)—Puritan crosscut intersected vein 500 ft. below present workings. Similar character ore as that on level above, where shoot proved 1500 ft. long, ranging from two to 25 ft. wide. Ore, lead-silver. Controlled by Days. Belief that drift in Sherman, also controlled by Days, which adjoins Tamarack & Custer on east, will be extended to make permanent outlet at Burke, eliminating two-mile tramway from mine to mill. Sherman drift considerably below Puritan crosscut.

MICHIGAN

Copper District

FRANKLIN (Dennon)—Small force sinking No. 1 shaft from 37 level. Drifts to be driven north to cut vein opened on 27 level. Assessment of $3 per share is due.

QUINCY (Hancock)—Transfer of 125 acres of mineral lands of Hancock Consolidated to the Quincy company for a consideration of $235,000 has been arranged. Mineral lodes underlying 90 acres occur on the dip below the 8500 level of Quincy.

MICHIGAN (Rockland)—Limited force working in ground on Butler lode.

Menominee Range

ARAGON (Norway)—New electric-driven Laidlaw Dunn Gordon air compressor installed at No. 4 shaft, now in operation. Capacity, 2250 cu.ft. free air per min.; pressure, 90 lb. Synchronous motor drive, power from hydro-electric plant at Quinnessec Falls. Duplicate of this unit will be installed at No. 5 shaft. High-pressure air system used for pneumatic locomotives underground will not be changed over to electric drive, but electric haulage may be installed later if mine developments warrant.

Gogebic Range

TILDEN (Bessemer)—Top of wooden headframe at No. 10 shaft was pulled off and mule on trestle killed by over-winding of loaded skip. Men on landing escaped injury. Shaft shut down from May 24 until probably June 3.

MINNESOTA

Cuyuna Range

CROFT (Crosby)—Underground iron ore property of John A. Savage & Co. producing at record rate. Savage company reported to have sold considerable tonnage of iron and manganiferous ores, which will tax properties to the utmost to produce.

IDA MAE (Crosby)—W. H. Fetzer, of Pittsburgh, representing new owners, visited property with view of putting it on shipping list.

NORTHLAND (Cuyuna)—Underground development from shaft proceeding at good rate. Hoisting and stocking manganiferous ore.

CUYUNA-DULUTH (Ironton)—Shipping stockpile containing 60,000 tons. Operated by American Manganese Manufacturing Company.

ROWE (Riverton)—Now operated by Pickands, Mather & Co. Expects to ship 125,000 tons milling and underground ore this season.

SAGAMORE (Riverton)—Stripping manganiferous open pit of John A Savage & Co. by Winston-Dear & Co., contractors. Expect to ship considerable tonnage later.

NORTH RANGE IRON COMPANY (Trommald)—One drill working in orebody on Section 4-46-29.

Vermilion Range

ZENITH (Ely)—Completed installation of Sirocco blower to facilitate ventilation.

MONTANA

Jefferson County

CARRIER MINE (Carrier District)—Strike of high-grade gold-copper ore made by James Currier, near Montana City.

LIVERPOOL (Clancey)—Developed to 750-ft. depth. High-grade ore known above lower level as well as below it. Shoot is exhausted above sixth level. Will soon be opened with Boston capital. Electric power.

FLEMMING MINE (in Warm Springs District)—Bonded and leased by Butte men.

Lewis and Clark County

HELENA MINE (Helena)—Contract for 400 ft. drifting at 400 level about completed; announced further sinking will begin soon. Shaft to go to 500 level.

PETE SOLORAI (Rimini)—High-grade silver-producing property. Bonded to Helena parties, who have started work.

PORPHYRY (Rimini)—Preparing to start mill on the dike soon. Ore reserves are large. Electric power. Dike not operated last season, because of labor scarcity and war conditions.

TONY LODE (Rimini)—Streak of galena ore found in Tony tunnel near Rimini. Being developed by shaft.

NEVADA

Lincoln County

PIOCHE DISTRICT ore shipments for week ended May 22 were: Prince Consolidated, 25 cars; Virginia-Louise, 5 cars; Harney, 3 cars; Black Metals, 1 car.

VIRGINIA-LOUISE (Pioche)—High-grade bedded oreshoot, encountered some weeks ago, increasing in size and value. Has attained width of 20 ft. and thickness of 6 ft. Last 25 tons broken averaged 0.03 oz. gold, 28.7 oz. silver, and 27.9% lead.

NEW MEXICO

Grant County

PLAYAS (Hatchita)—In Playas basin, which lies southwest of Hatchita, over 100,000 acres of state lands leased by oil prospectors in rush, owing to report that small amount oil encountered in well on what is locally known as Playas Lake, which lies west of old gold camp at Sylvanite.

85 MINE (Lordsburg)—Continue shipments of about 200 tons siliceous ore to Calumet & Arizona smeltery at Douglas, Ariz. J. Jackson, superintendent.

LAST CHANCE (Lordsburg)—Mill shut down owing to scarcity of water; six-mile pipe line will be installed. Working small force in mine. B. Prescott, manager.

NORTH CAROLINA

Montgomery County

GOLD VEIN discovered at Sadberry property. Development consisting of cut along deposit reveals number of rich quartz stringers in apparently weathered rhyolite. Some years ago similar conditions found in stringer belt in property paralleling one recently found. Some rich ore removed, mill erected, and 100-ft. shaft sunk.

Randolph County

AT PORTER PROPERTY, 10 miles east of Ashboro, Marathon mill will be installed, and mining of low-grade gold deposit undertaken. Donald Cameron in charge.

OKLAHOMA

Miami District

LUCKY PAT (Lincolnville)—Building mill to be in operation in 30 days. W. L. Turner, contractor.

CANTON (Lincolnville) — Completed sludge mill to be operated separately from mill. Concentrating mill will be in operation soon.

HIDDEN TREASURE (Picher)—New mill completed and started in operation. John Grifford, of Baxter Springs, Kan., manager.

TIGER (Picher)—Subleased the ground at its No. 2 mine near Tar River to company of practical miners. The mill to be operated by Tiger Co. G. F. Glenn, Carthage, Mo., manager.

SOUTH DAKOTA

Custer County

CRAWFORD MICA (Custer)—Work resumed at Old Mike mines and following extensive development regular shipments of mica will be made.

RARE METALS (Custer)—Small concentrator using Bland screens and Bartlett tables dressing tin ores from the Oreville district.

Lawrence County

CUSTER PEAKE (Roubaix)—Concentrator completed and placed in operation. Mine development has opened sufficient copper ore to keep plant in continuous operation.

TEXAS

Brazos County

WEST COLUMBIA FIELD PRODUCTION was 17,600 bbl. per day for third week in May. Production increased largely over previous week by bringing in of Texas company's Eyers No. 3 well and Crown Oil and Refining Co.'s William Olschewski No. 2 well, both showing big flow.

CROWN OIL & REFINING (West Columbia)—William Olschewski well No. 2 brought in May 17, estimated making 3500 bbl. daily. Oil of good quality. Third large well in field during that week.

GULF PRODUCTION (West Columbia)—Hogg well No. 2 brought in at 3000 ft. said to be making 250 bbl. a day.

Harris County

HUMBLE FIELD PRODUCTION was 9700 bbl. daily during third week in May. Two small pumpers completed during week. Petroleum Refining Co.'s Stevenson No. 3 pumping 10 bbl. from 2765 ft., and Crown Oil & Refining Co.'s Herman No. 43 pumping 10 bbl. from 1040 feet.

CROWN OIL AND REFINING (Houston)—At meeting of board of directors May 13 dividend of 100 per cent. declared. Capital stock increased from $2,000,000 to $5,000,000. New directors elected: J. F. White, Lampas, Tex.; E. Rafael, Ennis, Tex.; Charles E. Merrill, New York City. Was organized Aug. 26, 1917, when it took over interests of Huffstutler Oil Co. First dividend, of 10 per cent., paid Aug. 26, 1918. Second dividend as above. Is building a $1,000,000 refinery on Houston ship channel, and has producing wells in Humble, Goose Creek, and West Columbia fields. Officers are: J. C. Stribling, president; J. W. Colvin, vice-president; R. L. Young, secretary and general manager; O. J. Doubeck, treasurer. Board of directors comprised of officers and A. A. Huffstutler, and George E. Colvin, of Warren, Penn.

Liberty County

DAILY PRODUCTION OF HULL FIELD now about 9000 bbl. Houston Oil Co. recently brought in a large producer.

Matagorda County

THE TEXAS CO. (Markham)—Preparing to test its No. 6 Meyers at 1650 ft. In same field Clem Oil Co., working over its No. 3 Smith well, and P. S. Griffiths is drilling below 2700 ft. In this same county "Wildcat" well at Stewart's Switch is below 3700 ft. without results; drilling still under way.

Tarrant County

FORT WORTH CHAMBER OF COMMERCE, through its publicity department, shows 1012 wells drilled in that section during present period of activity. Figures do not include work done in Burkburnett, Electra, and other northern fields. Estimated cost of all development in central-west Texas at least $50,000,000.

UTAH

Beaver County

CAPITOL MINING (Milford)—Shaft now in vein and heavy iron sulphides showing in bottom. Down 225 ft., and 50 ft. more to go before starting drifting. Gold Crown and Magnolia, neighboring properties.

Grand County

KEARNS CLAIMS (Moab) — Uranium ores stockpiled by this property being sought,' it is stated, by Minerals Recovery Co., which has bought Government plant at Denver.

Juab County

EUREKA MINES (Eureka)—New ore, silver-lead, opened between 900 and 1000 levels.

LEHI TINTIC (Eureka) — Air tunnel making connections with main workings in 700 ft. cut vein. Connections to be completed in about 30 ft. Fissure opened by winze from upper tunnel 4 ft. between walls and carries bunches of galena, with high contents in silver.

LITTLE COTTONWOOD TRANSPORTATION (Alta)—Narrow gage taking out 12 cars daily, equivalent to two regular cars.

MAY DAY (Eureka)—To be developed at depth. Work in progress on 1100, but several hundred feet additional depth desired.

TINTIC UNION (Eureka) — New company formed to operate in East Tintic district owns 22 claims. Capitalization, 2,000,000 shares, par value, 10c., of this 1,600,000 in treasury, and 600,000 shares taken by promoters for ground. H. G. Snyder, interested.

Salt Lake County

COLUMBUS-REXALL (Alta)—To begin shipping season with about 25 tons daily, to be increased later.

EMMA SILVER (Alta)—Emma Consolidated, Emma Copper, and Old Emma mines being reorganized under above name. McCornick & Co. paid and stock held by it transferred to F. B. Cook, of Columbia Trust Co., trustee. Enough money on hand to pay all approved claims, and June 7 fixed as date for hearing and determining these.

MICHIGAN-UTAH (Alta)—Shipping car of ore daily over cable tramway. All work on company account.

SECRET MINING (Alta) — Directors' meeting called for June 9 to consider increasing capitalization from 600,000 to 1,000,000 shares and reducing par value from $1 to 10c. a share. Owns 30 claims adjoining Albion. H. S. Hooper interested.

SOUTH HECLA (Alta)—Shipping up to 100 tons ore daily over Little Cottonwood Transportation.

WOODLAWN MINING (Alta)—Accumulating ore for shipment.

KENNEBEC (Salt Lake)—To be worked through Cardiff. Ezra Thompson, of Cardiff, interested.

Summit County

GLEN-ALLEN (Park City)—Mill building completed and machinery to be installed soon.

SILVER KING COALITION (Park City)—W. Mont Ferry appointed managing director, succeeding W. W. Armstrong.

tah County

AMERICAN CONSOLIDATED (American Fork)—Power for machine drills to be obtained from old Mineral Flat compressor, now owned by Albion Consolidated.

SOUTH PARK (American Fork)—Work started on ore showings about 450 ft. from portal of tunnel, total length of 700 feet.

WASHINGTON

Ferry County

LAURIER MINING CO. (Laurier)—Shipping carload copper ore this week. Dayton H. Stewart, president.

Grays Harbor County

KING OIL CO. (Hoquiam)—First load of machinery delivered at well site May 10. Landed about 12 miles from mouth of Queets River last season; now being moved from that point on scow of shallow draft towed by team of horses. Many thousand of acres have been leased for their oil rights in district, and many leases are being taken by private parties for speculative purposes. Not an acre of school land can be leased now, all having been taken up at $110 per section.

Snohomish County

ETHEL MINE (Index)—Former producer; idle for several years. Recently leased and exploration work carried on in small way to find continuation of oreshoot believed to have been missed by former exploration work.

SUNSET COPPER (Index)—Mine and mill idle for last three months. Dewatering just completed, and small crew carrying on exploration. Has good reserves of milling ore, but management awaiting more favorable copper market. Dale L. Pitt, manager.

Stevens County

BROWN LAKE MINE (Valley) — J. Richard Brown, of Spokane, reports striking 4-ft. copper ore, also carrying gold and silver.

WISCONSIN

Zinc-Lead District

M'KINLEY EXTENSION (Dodgeville)—Levi Pollard and others opened property, adjoining McKinley mine, at Dodgeville. Plan to erect concentrating mill, contingent upon ore-market conditions.

MINERAL POINT ZINC CO. (Galena)—Opened new zinc carbonate property on Eberle farm adjoining Clark mines, at Highland. New strike in shallow ground, easily mined.

KISTLER & STEPHENS (Platteville)—Recent churn-drill borings indicate rediscovery of ore range on Alderson tract, abandoned by this company two years ago.

CANADA

British Columbia

FLORENCE SILVER MINING CO. (Ainsworth)—The retiring board of directors reëlected at the company's annual meeting of stockholders at Ainsworth May 14. R. F. Wolfe, Spokane, president and manager; A. F. Kelly, vice-president; D. E. Sanders, secretary-treasurer; and J. A. Lavender and A. M. Frost, constitute board.

Ontario

KING EDWARD (Cobalt) — Leased to National Mining Co.; being dewatered.

BERRY CLAIMS (Kirkland Lake)—Optioned to interests closely identified with McIntyre.

MONTREAL KIRKLAND (Kirkland Lake)—Shaft down 150 ft. Mining plant being installed.

TECK HUGHES (Kirkland Lake)—April prodution, $27,216, from treatment of 2602 tons.

DAVIDSON (Porcupine) — Orebody at 500-ft. level drifted on for 75 ft., average grade of ore remaining high. Mill heads during May average $20 per ton. Winze being put down from 500-ft. level to 800 feet.

GOLD REEF (Porcupine) — Diamond drilling will soon be undertaken.

SOVEREIGN (Porcupine)—Surface veins being tested at depth by extensive diamond drilling.

The Market Report

SILVER AND STERLING EXCHANGE

May	Sterling Exchange	Silver New York, Cents	Silver London, Pence	June	Sterling Exchange	Silver New York, Cents	Silver London, Pence
29	4.6325	108¼	52	2	4.6300	109⅛	52¾
30	.....	....	52	3	4.6125	109	53⅜
31	4.6300	109⅛	53	4	4.6138	109⅛	53¼

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

May June	Copper Electrolytic	Tin Spot.	Lead N. Y.	Lead St. L.	Zinc St. L.
29	16.35	†72¼	5.15 @5.25	4.90	6.12½ @6.15
30	.....	....	....	....	....
31	.....	....	....	....	....
2	16.35	†72¼	5.15 @5.25	4.90 @5.00	6¼
	16.35		5.15	4.90	6.10
3	@16.45	†72¼	@5.25	@5.00	@6¼
4	16.60	†72¼	5.15 @5.25	4.90 @5.00	6.10

† Government price.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

LONDON

May June	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot
29	79⅛	79⅛	82	233½	229⅛	22⅛	23	36
30	78⅜	79	82	232½	229	22⅛	23	35⅝
31	....	....	....	....	....	....	....	....
2	79⅛	80	82	235	231	22⅛	23	35⅛
3	79⅛	79⅛	81½	235	231½	22⅛	23	35⅛
4	78⅛	79	81	234	231	22⅛	23	35⅛

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb.

Metal Markets

NEW YORK—June 4, 1919

The metal markets were very quiet during the early part of this week, but at the close there was a substantial renewal in the demand for copper, which was sufficient to lead producers to advance their price. Lead was very dull. Zinc was dull and soft.

Memorial Day coming on Friday, Saturday was generally observed as a holiday also, practically all offices being closed.

Transatlantic freights are easier. Though the liners are still demanding $30 to France, contracts with outsiders can easily be made at $20 for future shipments, and freight on the spot may be taken as low as $15 if something is needed to complete the cargo of ship. The rate to British ports continues at $20, with possibility of shipping goods on the spot as low as $18. From Pacific ports the rate to Hong Kong and Kobe continues at $14.

Copper—On Thursday the market continued very dull, but the big producers booked small business for June and July on the basis of 16.35c., cash., New York. A round lot for June-September delivery was booked by one concern on the same terms. On June 2, a moderate business, including one round lot for export, was done on the same basis. On June 3 there was a decided renewal of demand by domestic manufacturers. The bulk of the business was taken by one producer at 16½c., delivered, equivalent to 16.35c., cash, New York, which producer had not previously sold enough to satisfy itself. However, before the end of the day another seller succeeded in booking some substantial business on the basis of 16.45c., cash, New York, and several producers were asking the equivalent of 16.60c. (16⅝c., delivered.) On Wednesday the market became firmly established on the higher basis, some further round lots being placed.

The full figures of the sales in May proved to be larger than any previous estimate, and were actually in excess of the production for the month.

Some of the refineries in the vicinity of New York are now working at only half rate, but others are producing more nearly at their full capacity in order to use up stocks of blister copper. Labor conditions are generally easier, but no reductions in wages have been made, the men being employed only part of the time.

British advices report a sentiment over there to the effect that arrangements should be made for the purchase of copper from Australia, where many of the mines have had to be closed, rather than to buy copper from America. However, the probability is that Great Britain has had enough of subsidies, etc., and will buy copper where it can be obtained most cheaply, but will first use up the stocks already in hand.

Copper Sheets—The base price of copper sheets is 24c. per lb. Copper wire is quoted at 18½c.

Tin—Under date of June 2, Mr. Armsby issued the following statistics:

	Gross tons
Total quantity allocated to United States	10,169
Sales to Apr. 30, 1919, inclusive....	6,863
Balance unsold May 1, 1919	3,306
Sales between May 1 and May 22, 1919, inclusive	1,107
Balance unsold May 23, 1919.....	2,199
Sales May 23 to May 31, 1919 inclusive	584
Balance unsold June 1, 1919.....	1,615

The above figures indicate that the Inter-Allied tin will be used up sooner than expected, possibly as early as July 1. This does not necessarily imply that the tin market will then become free from restrictions.

Lead—This market is very dull, the business of the week, aside from what was done on average-price contracts, being light. The most important producers find themselves in comfortable positions, and therefore express considerable indifference respecting the temporary relaxation in buying. Other concerns that might do something in the market are inclined to stand aloof and observe things for a while. In the interior, the market was a little stronger, reflecting a good deal of carload buying. In New York, lead continued to be offered at low figures by second hands.

Considerable export business in Mexican lead was done during the week.

Zinc—This market continued to exhibit dullness, for which lately it has been conspicuous. There was a noticeable softness, and during the latter part of the week a large producer was seller at low figures.

A fair business in high-grade zinc was done at about 6¾c., New York, with some carload business reported done at 7c.

Zinc dust could be bought at about 9c., f.o.b, works.

Zinc Sheets—The quoted price of zinc sheets is $10 per 100 pounds.

Other Metals

Aluminum—Virgin metal quoted at 33c. per pound. Unchanged.

Antimony—The market was steady at 8⅞@8¼c., the closing quotation of last week, and a fair business was reported done. As to future shipments, no Chinese antimony was offered, but Japanese for June shipment was quoted at 8¼c., New York.

Bismuth—Metal of the highest purity for pharmaceutical use is quoted at $3.20 per lb. for wholesale lots—500 lb. and over.

Cadmium—Quoted at $1.40 per lb. in lots of 500 pounds.

Nickel—Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound.

Quicksilver—The market remained firm at $92. San Francisco telegraphed $87, steady.

Silver and Platinum

Silver—The market has shown a rising tendency for the last week, but is rather quieter today at 53¼d. The steadiness has been maintained in part by some buying on China account. Exports of bar silver for week ended May 31st, 376,300 ounces.

Mexican dollars at New York, May 29, 83½; May 30, 83½; May 31, 81; June 2, 84½; June 3, 84½; June 4, 84.

Platinum—Refined ingot was firm at $105.

Palladium—Unchanged at $120.

Zinc and Lead Ore Markets

Joplin, Mo., May 31—Blende, per ton, high, $44.35; basis 60% zinc, premium, $42; Prime Western, $41@40; sludge, $37.50; flotation, $35; calamine, basis 40% zinc, $25@22. Average settling prices: Blende, $37.14; calamine, $23.21; all zinc ores, $36.68.

Lead, high, $63.80; basis 80% lead, $60@57.50; average settling prices, $57.40 per ton.

Shipments the week: Blende, 11,193; calamine, 389; lead, 1252 tons. Value, all ores the week, $496,690.

Shipments five months: Blende, 233,158; calamine, 6231; lead, 33,091 tons. Value, all ores five months, $11,382,360.

The large producing Bertha A mine, at Webb City, has closed down. The American Z., L. & S. Co. is running its mill, with its mining ground leased for working in the upper levels. This leaves practically only one large mill in the older camps in operation, the Mutual, at Oronogo. In all of Jasper County, Mo., less than a half dozen mills are regularly in operation, outside of the new Waco field.

Plattesville, Wis., May 31—Blende, basis 60% zinc, $44 base for premium grade and $42.50 base for high-lead grade.

Lead ore, basis 80% lead, $56 per ton.

Shipments reported for the week are 2015 tons blende, 189 tons galena, and 568 tons sulphur ore.

For the year to date the totals are 41,798 tons blende, 2088 tons galena, and 5532 tons sulphur ore. During the week 3026 tons blende was shipped to separating plants.

Other Ores

Molybdenum Ore—No business reported.

Tungsten Ore—A fair business was done, mainly in Chinese ore, which was sold at $7 per unit for ore on the spot and at slightly higher figures for futures. It is now reported that China will not sell any more at less than $8 per unit. High-grade ore is quoted at $9@10, with $11@12 asked for some of exceptional quality.

Pyrites—Spanish pyrites is quoted at 20c. per unit for furnace ore and 18c. for unbroken ore, c.i.f., New York or other Atlantic port. Unchanged.

Iron Trade Review

PITTSBURGH—June 3.

The last week has witnessed additional though slow progress in the improvement in steel demand that characterized the fortnight preceding. In practically all descriptions of finished-steel products the buying is heavier. There is, however, little broadening in the scope of demand, buying being confined largely to the same quarters as formerly, so that buying against large construction projects is still conspicuous by its smallness, if not by a complete absence. There are reports, however, that matters are improving in that direction, and in some quarters the belief is entertained that within a few months there will be a marked increase in construction work. It is considered remarkable that there is as much demand for steel as is apparent, when so little is going into large construction undertakings. Much work of this description is in prospect—work that has been definitely planned and estimated on, according to the testimony of building firms and steel fabricating shops.

As to buying of railroad material, there are no favorable prospects for the current year. Possibilities of railroad expansion and improvement are almost limitless. The governing factor will be the conditions Congress is about to decree as to railroad operation in future.

Formal reduction or general decline in the steel market in the near future is now regarded as improbable in practically all quarters. Predictions made by many observers late in March and in April that there would be "another reduction in June" are universally admitted to have proved incorrect.

Pig Iron—Production of merchant pig iron seems to be adjusted at last to consumption, if, indeed, current consumption is not in excess of production. Furnaces have light stocks, and many consumers who had large stocks two or three months ago have reduced them. Sales are somewhat greater, but are still confined to small individual lots, for early delivery. Now and then there is an exception, as in the case of a large malleable foundry interest on the lake front, which recently bought 2000 tons of malleable from four furnaces, deliveries over a period of several months. Though there is some shading, the market in general is quotable at Mar. 21 prices, at furnace: Bessemer, $27.95; basic, $25.75; malleable, $26.25 to $27.25; foundry, $26.75; forge, $25.75, freight from Valleys to Pittsburgh being $1.40, but one furnace with only $1.10 freight to Pittsburgh also quotes these prices. W. P. Snyder & Co. report averages prices for May, based on actual sales, at $27.95 for bessemer and $25.75 for basic, at Valley furnaces. On foundry iron the average quotation in May was $26.75, Valley.

Steel—There is no improvement in billets, which are sluggish, but sheet bars show more activity. One or two sheet-bar contracts have been made for delivery over about three months, but in general the buying is for delivery as soon as it can be made, generally within a week or two. There is a report that some mills are considering the making of an advance in billets, from the present $38.50 to $41, in recognition of recent criticism of finished-steel prices, that they were too much above billets. Sheet bars remain quotable at $42, slabs at $41, and rods at $52.

Ferromanganese—It is somewhat more difficult to pick up resale 80% ferromanganese, indicating that there is little chance of shading the prices recently quoted, $110 @115, delivered. Furnaces continue to quote $150, but of course this quotation is nominal. Though imported is not closely quotable, it could be had at less than this price at any rate. Spiegeleisen remains nominal at about $33@35, delivered, for resale 18 per cent.

Coke—The tone of the Connellsville coke market is materially improved. It is more difficult than formerly to shade $4 on spot or prompt furnace coke, and producers on second-half contracts are talking prices all the way from $4.25 to $5. Furnaces would hardly pay such price, and buying may be done simply from month to month. Foundry coke is stronger, fewer brands being obtainable at $4.50 for prompt, though there is much business in favorite brands at $5 and occasionally higher. Some negotiations have started for twelve-month contracts to date from July 1, but nothing is definite. Production in the Connellsville and Lower Connellsville region is running at about 100,000 tons a week, about half by merchant ovens and half by furnace ovens.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1917	1918	1919	1917	1918	1919
Jan.	75.630	88.702	101.125	36.682	44.356	48.438
Feb.	77.585	85.716	101.125	37.742	42.792	48.027
Mar.	73.861	88.082	101.125	36.410	43.620	48.171
April	73.875	95.346	101.125	36.963	47.215	48.886
May	74.745	99.505	107.135	37.940	48.980	52.104
June	76.971	99.500		39.065	48.875	
July	79.010	99.625		40.110	48.813	
Aug.	85.407	100.292		43.418	49.077	
Sept.	100.740	101.125		50.920	49.500	
Oct.	87.332	101.125		44.324	49.500	
Nov.	85.891	101.125		43.584	48.969	
Dec.	85.960	101.125		43.052	48.492	
Year	81.417	96.772		40.851	47.516	

New York quotations cents per ounce troy, 999 fine London, pence per ounce, sterling silver, 925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1918	1919	1918	1919	1918	1919
Jan.	23.500	(a)	110.000	92.238	125.000	106.619
Feb.	23.500	16.763	110.000	78.700	125.000	95.700
Mar.	23.500	14.956	110.000	76.821	125.000	82.071
April	23.500	15.246	110.000	77.300	125.000	82.200
May	23.500	15.864	110.000	77.767	125.000	81.227
June	23.500		110.000		125.000	
July	25.904		119.913		134.913	
Aug.	26.000		122.000		137.000	
Sept.	26.000		122.000		137.000	
Oct.	26.000		122.000		137.000	
Nov.	26.000		122.000		137.000	
Dec.	(a)		118.447		133.167	
Year	24.628		115.530		130.507	

(a) No Market.

Tin	New York		London	
	1918	1919	1918	1919
January	85.500	67.702	293.227	248.557
February	92.000	66.801	311.525	223.963
March	(a)	67.934	318.875	236.843
April	(a)	72.500	329.905	225.275
May	(a)	72.500	364.217	234.398
June	(a)		331.925	
July	(a)		360.347	
August	(a)		380.900	
September	(a)		343.905	
October	(a)		335.543	
November	(a)		323.550	
December	(a)		267.736	
Av. year	(a)		330.138	

(a) No average computed.

Lead	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	6.782	5.432	6.684	5.316	29.00	37.227
February	6.973	5.057	6.899	4.784	29.00	28.675
March	7.201	5.226	7.091	4.992	29.00	27.952
April	6.772	4.982	6.701	4.722	29.00	24.888
May	6.818	5.018	6.704	4.773	29.00	23.852
June	7.611		7.511		29.00	
July	8.033		7.750		29.00	
August	8.050		7.750		29.00	
September	8.050		7.750		29.00	
October	8.050		7.750		29.00	
November	8.050		7.750		31.20	
December	6.564		6.324		40.00	
Year	7.413		7.222		30.10	

Spelter	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	7.836	7.272	7.661	7.922	54.000	56.045
February	7.814	6.623	7.639	6.273	54.000	46.150
March	7.461	6.500	7.286	6.150	54.000	38.500
April	6.890	6.465	6.715	6.114	54.000	36.118
May	7.314	6.429	7.114	6.079	54.000	35.477
June	8.021		7.791		54.000	
July	8.688		8.338		54.000	
August	8.985		8.635		54.000	
September	9.442		9.092		54.000	
October	8.801		8.451		54.000	
November	8.491		8.141		54.100	
December	8.163		7.813		56.050	
Year	8.159		7.890		54.180	

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pgh.	Bessemer‡		Basic‡		No. 2 Foundry	
	1918	1919	1918	1919	1918	1919
January	$37.25	$33.60	$33.95	$31.40	$33.95	$32.40
February	37.25	33.60	33.95	31.40	33.95	32.40
March	37.25	32.54	33.95	31.40	33.95	29.12
April	36.15	29.35	32.95	27.15	33.95	28.15
May	36.20	29.35	33.00	27.15	34.00	28.15
June	36.36		33.16		34.16	
July	36.60		33.40		34.40	
August	36.60		33.40		34.40	
September	36.60		33.40		34.40	
October	36.60		34.40		35.40	
November	36.60		34.40		35.40	
December	36.60		34.40		35.40	
Year	$36.67		$33.70		$34.45	

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. EXCH.†	June 3
Alaska Gold M.	3⅛
Alaska Juneau	2⅜
Am.Sm.&Ref.,com.	80
Am.Sm. & Ref., pf.	106½
Am.Sm.Sec., pf., A	93⅛
Am. Zinc	16⅛
Am. Zinc, pf.	52
Anaconda	69⅛
Batopilas Min.	1⅛
Bethlehem Steel	83⅛
Butte & Superior	28
Butte Cop. & Zinc	13
Cerro de Pasco	43
Chile Cop.	24⅛
Chino	39⅛
Colo. Fuel & Iron	49
Crucible Steel	90⅛
Crucible Steel, pf.	100⅛
Dome Mines	14
Federal M. & S.	14⅛
Federal M. & S., pf.	42⅛
Great Nor., ore ctf.	45⅛
Greene Cananea	42⅛
Gulf States Steel	75⅛
Homestake	‡85
Inspiration Con.	56⅛
International Nickel	27⅛
Kennecott	36
Lackawanna Steel	84⅛
Mexican Petrol.	189
Miami Copper	27⅛
Nat'l Lead, com.	79⅛
National Lead, pf.	‡109
Nev. Consol.	17⅛
Ontario Min.	8⅛
Ray Con.	22⅛
Republic I.&S.,com.	87⅛
Republic I.&S., pf.	‡104
St. Joseph Lead	14⅛
Sloss-Sheffield	63⅛
Tennessee C. & C.	14⅛
U. S. Steel, com.	107⅛
U. S. Steel, pf.	116⅛
Utah Copper	80
Va. Iron C. & C.	‡67
Worthington Pump	69⅛

BOSTON CURB*	June 3
Boston Ely	2
Boston & Mont.	.75
Butte & Lon'n Dev.	.15
Calaveras	1⅛
Chief Con.	3⅛
Contact	.05
Cortez	.12
Crown Reserve	.40
Crystal Cop.	.12
Eagle & Blue Bell	2⅛
First Nat. Cop.	2
Gadsden Cop.	3⅛
Houghton Copper	.75
Intermountain	‡.05
Iron Blossom	.38
Iron Cap	.10
Majestic	.21
Mexican Metals	.20
Mines of America	‡.05
Mojave Tungsten	.15
Nat. Zinc & Lead	.10
Nevada-Douglas	.16
New Baltic	1⅛
Oneco	1
Pacific Mines	‡.25
Rex Cons.	.14
Yukon Gold	.80

SAN FRAN.*	June 3
Alta	‡.08
Andes	‡.30
Beat & Belcher	‡.20
Caledonia	‡.24
Challenge Con.	‡.03
Confidence	‡.25
Con. Virginia	‡1.95
Gould & Curry	‡.10
Hale & Norcross	‡.25
Jacket-Cr. Pt.	‡.20
Mexican	‡.52
Occidental	‡.40
Ophir	‡1.55
Overman	‡.10
Savage	‡.20
Sierra Nevada	‡.15
Union Con.	‡.35
Utah Con.	‡.04
Belmont	3.50
Jim Butler	.36
MacNamara	1.00
Midway	.37
Mont.-Tonopah	‡.20
North Star	.10
Rescue Eula	.17
West End Con.	2.10
Atlanta	.04
Booth	.09
Comb. Frac.	.04
Florence	.43
Jumbo Extension	.12
Kewanas	.03
Nevada Hills	.05
Nevada Packard	.20
Round Mountain	.39
Silver Pick	.07
White Caps	.19

COLO. SPRINGS*	June 3
Cresson Con.	4.31⅛
Doctor Jack Pot	.03⅛
Eikton Con.	.05
El Paso	.18
Gold Sovereign	‡.02
Golden Cycle	1.67
Granite	.14
Isabella	.04⅛
Mary McKinney	.07⅛
Portland	.98⅛
United Gold M.	.15⅛
Vindicator	.32

BOSTON EXCH.†	June 3
Adventure	1⅛
Ahmeek	2⅛
Algomah	‡.60
Alloues	40
Ariz. Com.	14
Arnold	‡.20
Bingham Mines	9⅛
Bonanza	‡.20
Butte-Balaklava	.60
Calumet & Ariz.	65⅛
Calumet & Hecla	400
Carson Hill	13⅛
Centennial	15
Copper Range	48
Daly West	2⅛
Davis-Daly	6⅛
East Butte	13
Franklin	4⅛
Granby	‡66⅛
Hancock	6⅛
Hedley	‡12
Helvetia	4⅛
Indiana	1
Isle Royale	31⅛
Keweenaw	2
Lake	6⅛
La Salle	4⅛
Mason Valley	3⅛
Mass.	6⅛
Mayflower	10
Michigan	6⅛
Mohawk	64⅛
New Arcadian	3⅛
New Cornelia	19⅛
New Idria	10
Nipissing	11⅛
North Butte	14
North Lake	90
Ojibway	3
Old Dominion	37⅛
Osceola	56
Quincy	68
St. Mary's M. L.	59
Santa Fe	‡.25
Seneca	24⅛
Shannon	3⅛
Shattuck-Ariz.	‡11
So. Lake	2⅛
So. Utah	.25
Superior	9
Superior & Bost.	3⅛
Trinity	4⅛
Tuolumne	1⅛
U. S. Smelting	67⅛
U. S. Smelting, pf.	49⅛
Utah Apex	3⅛
Utah Con.	10
Utah Metal	2⅛
Victoria	4
Winona	1⅛
Wolverine	21⅛

N. Y. CURB†	June 3
Am. Tin & Tung.	⅛
Big Ledge	1⅛
Butte & N. Y.	⅛
Butte Detroit	‡.03
Caledonia	.40
Calumet & Jerome	⅛
Can. Cop. Corpn.	⅛
Carlisle	‡2
Cashboy	.09⅛
Con. Ariz. Sm.	1⅛
Con. Coppermines	5
El Salvador	4⅛
Goldfield Con.	.21
Goldfield Merger	‡.05
Hecla Min.	5⅛
Howe Sound	4⅛
Jerome Verde	⅛
Louisiana	⅛
Magma	‡31
Marsh	‡.08
McKinley-Dar-Sa.	.63
Milford	‡.75
Mother Lode	.44
Nixon Nevada	.33
Ohio Cop.	‡.50
Rawley	‡2⅛
Ray Hercules	2⅛
Richmond	‡.50
Rochester Mines	.22
Standard S. L.	⅛
Stewart	.30
Success	‡.05
Tonopah	⅜
Tonopah Divide	9
Tonopah Ex.	2⅛
Tribullion	‡.25
Troy Arizona	‡.10
United Eastern	4⅛
United Verde Ext.	.29
United Zinc	‡.25
Utica Mines	‡.08

TORONTO*	May 27
Adanac	.20
Bailey	.03
Beaver Con.	.45
Chambers Feriand	‡.10
Coniagas	2.00
Hargraves	.04
Kerr Lake	5.75
La Rose	.25
Lake Shore	1.00
Min. Corp. of Can.	2.00
Peterson Lake	.07
Teck-Hughes	.15
Temiskaming	.40
Wettlaufer-Lor.	.03
Davidson	‡.68
Dome Exten.	.30
Dome Lake	.20
Hollinger	6.75
McIntyre	1.75
Newray	.12⅛
Porcu. Crown	.30
Vipond	.20
West Dome	.13

*Bid prices. † Closing prices. ‡ Last quotations.